THE

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*WITH WHICH IS INCORPORATED*

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**THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.**

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## Forthcoming Events.

FEBRUARY 26.

*Co-ordinating Committee*:—Joint meeting at Birmingham. "Press Tools for Sheet-Metal Working," Paper by J. L. Williams.

**Institute of British Foundrymen.**

FEBRUARY 23.

*Birmingham, Coventry and West Midlands Branch*:—Ordinary meeting. "The History of Melting Furnaces," Paper by E. M. Currie and W. G. Morgan.

## A New Departure.

The Institute of British Foundrymen has recently made a new departure in its general scheme of committees, and has set up a Technical Committee, with sub-committees for specific sections of the industry. The original impetus came from the realisation of the excellent work done in the United States by similar committees of the American Foundrymen's Association, particularly the committee on moulding sands.

There is no doubt whatever that this is a step in the right direction. For some years past the Institute has been approached to an increasing extent to nominate representatives to national committees such as those of the British Engineering Standards Association. These representatives have been appointed, but hitherto there has been no organised means of giving them the views of the body they are to represent. Indeed, there has been no organised means of ascertaining that opinion, and this the Technical Committee may well provide.

Again, much can be done in the vexed question of specifications. Any industry endeavouring to produce economically would like to see the multiplicity of specifications issued by various consumers, inspecting authorities and consulting engineers replaced by a small group of specifications having national status. Through this Committee the question may be considered and recommendations forwarded to the proper quarter. If the industry goes to a national body like the B.E.S.A. with a united demand and a united front its chance of success is greatly increased.

The Institute has made it abundantly clear that the work of this Committee will not in any way infringe on the natural sphere of the Cast Iron Research Association. Indeed, it is difficult to see how it could, since it lacks the resources of the latter in permanent staff and funds. Its work is essentially complementary, and the two bodies are, in fact, already co-operating in the work to be done. The Technical Committee should provide an admirable channel for the collection of information relating to the trade from those engaged in it, and should become a suitable body for considering and approving proposals for standardising methods and practices within the trade which are not really the concern of a national body like the B.E.S.A., because they do not interest or concern users.

Clearly the new Committee will find plenty of work to do, and the results of its deliberations will be awaited with considerable interest.

## Pity the Poor Lecturer.

Some years ago, when sitting upon an international committee, it was not considered undignified to discuss the question of hospitality to be accorded to officials and lecturers at international conferences, and since that time these little matters have run exceedingly smoothly. It is not a pleasant subject upon which to write, and we want to make it quite clear at the beginning that these remarks do not apply to any of the national engineering societies carrying local branches, but are addressed to purely local engineering and metallurgical associations. The following is a normal occurrence: Prominent people in the foundry industry are invited by local engineering societies to give lectures. Time is devoted to their preparation, money is spent on slides, may be on the carriage of samples and on travelling expenses. For this they are accorded a formal vote of thanks, and that ends the matter. The lecturer is not received on arrival, he is not offered refreshment before the meeting, he is left to unpack, arrange and repack his samples. Moreover, the chairman often devotes more of his opening remarks to lauding the next lecturer than extolling the guest of the evening. We are perfectly sure that all these little lapses are due to thoughtlessness. We suggest that the following routine should be followed by all societies in respect to their lecturers:—(1) The lecturer should be met on arrival; (2) accommodation, either private or hotel, should be reserved for him; (3) that the lecturer should have either dinner or supper with the President or other principal officer; (4) he should be given the opportunity of visiting a local works the next day. Surely, this is the minimum amount of hospitality that can be extended to one who has devoted many hours of time for the benefit of the members. Another small matter is that the chairman should be provided with a short biography of the lecturer, so that the audience may have a proper introduction to their guest of the evening. We sincerely hope that as a result of these observations we shall hear no more tales of this and that association being discourteous to its lecturers.

XUM

# Institute of British Foundrymen.

## ANNUAL DINNER OF SHEFFIELD BRANCH.

The annual dinner of the Sheffield and District Branch of the Institute of British Foundrymen was held at the King's Head Hotel, Sheffield, on February 13. In the absence of the Branch-President (the Hon. J. M. W. North) the chair was occupied by Mr. G. L. Oxley (Past-President of the Branch).

### The City of Sheffield.

Mr. A. Harley, of Coventry (Senior Vice-President of the Institute), proposed the toast of "The City and Commerce of Sheffield," and remarked upon the importance of the Sheffield Branch, which, he said, had provided more than one President of the Institute. He recalled that about four years ago the Convention was held in Sheffield, when Mr Goodwin was elected President. He was glad to note the presence of the Lord Mayor and the Master Cutler. It was most appropriate that they should take part in the gathering, for civic and commercial matters were really one. They were inter-dependent; the trade of the city provided the sinews of municipal enterprise. Sheffield was pre-eminent in the educational facilities that it afforded. It was famous for its university and for the high character of the technical information it imparted, particularly bearing on Sheffield trades. Among the world-famous names associated with Sheffield University he would like to mention that of Prof. Desch, who had always taken a great interest in the Foundry Institute.

The Lord Mayor of Sheffield (Alderman Harold Jackson) responded to the toast. He observed that the reputation of Sheffield's industries had been built up to a large extent upon the skill of those engaged in the manufacture of the city's articles. In this connection he instanced particularly the craftsmanship of the artisans and workmen. The Master Cutler (Mr. P. B. Brown), who also replied, expressed his appreciation of the work of the Institute.

### Progress in Steel Castings.

The toast of "The Institute of British Foundrymen and the Sheffield Branch" was offered by Mr. A. J. Grant, M.I.N.A. (managing director of John Brown & Company, Limited), who said that it was impossible to over-estimate the importance of such an association as the Institute of British Foundrymen, consisting, as it did, of people engaged every day in the practical work of the foundry. Such associations played an important part in the progress made in the art of casting. It should not be forgotten that casting, like all arts, was in a constant state of progress or flux, and that new ideas and new processes were necessary if they were to maintain their position among their competitors from abroad. He supposed that the art of casting and founding was one of the earliest known to mankind. He recently visited the Persian Exhibition at the Royal Academy, and he was much attracted by a casting in bronze, beautifully modelled, the date of which, he thought, was about 1000 or 1500 B.C. This showed the antiquity of the foundryman's craft. It was an art of which they could be very proud. To-day they were confronted with many problems. It was fairly easy to make good castings, but very difficult to make any money at the job. Without entering into thorny questions, he would like to express the hope that before long the fiscal system of the country would be so adjusted as to remove the disadvantages that at present existed in this respect. The Institute was doing a good work in the interchange of ideas and the introduction of improved methods at reduced costs. He understood that the Sheffield Branch was the third largest branch of the Institute in the country and had 10 per cent. of the membership. A further gratifying feature was that the Branch membership was steadily increasing. In these times of trade depression that was a remarkable feature. Speaking as an industrialist, he would like to see a little more interest shown in steel castings. The Institute dealt very largely with iron, and he understood that Papers dealing with steel castings were not quite so frequent as the importance of that particular branch merited. The importance of steel castings was growing. Many portions of pipe lines, stop valves and that type of article which, in the old days, could be made perfectly well with cast iron, could only now be safely used if made of steel. For that reason the production of good, sound steel castings was an important thing for the progress of engineering in this country. He believed that steel castings could be made in this country second to none, and that if it were not for the fact that the prices of foreign steel castings were about 25 per cent. less than ours, they would not hear so much from buyers about the supposed excellence of the foreign castings. He was certain that the preference at present shown for foreign castings was really unwarranted. It was to organisations like the Institute of Foundrymen that the trade of the country must look to improve the technical skill and for the interchange of ideas so as to put the profession into as sound a position as possible.

The Chairman responded, and read a message of good wishes from Mr. North, who is in the United States. Mr. North wrote of his disappointment at not being able to attend the dinner and hoped that it would prove a success. Referring to Mr. Grant's suggestion about the need for more lectures on steel, the chairman said that if there was a call for more lectures on that subject they would be arranged. The Sheffield Branch consisted largely of men interested in cast iron, but if they could get more steel founders in the Branch they would be able to include an increased number of Papers on steel founding.

# Book Review.

**Francis J. Blight, Publisher: A Biographical Sketch,** by George Hawker. Published by Elliot Stock, 7, Paternoster Row, London, E.C. Price 10s. 6d. net.

As chairman and managing director, for so long a period as from 1899 to 1927, of Charles Griffin & Company, Limited, the well-known publishers of technical works, Mr. Francis James Blight naturally is a respected figure in the world of publishing. Undoubtedly he is also a qualified critic of books upon new developments in engineering science, and it has been said of him—perhaps somewhat extravagantly—that he "did for *technical* literature what Cassel in his time did for *popular* literature."

In view of these facts, we consider that any biographical sketch of Mr. Blight as publisher should have been confined mainly within the bounds of his public and business activities. The book under review does not observe these limits, and we believe it to be of rather too intimate a character to appeal to the general reader. Our remark is borne out by the fact that the book was prepared in the first place for private printing. A bare thirty pages of the total 176 are devoted to the interesting aspect of Mr. Blight's capacity of publisher, thus rendering the sub-title almost inapplicable. We learn that he was urged by Sir Robert Hadfield, Bt., and numerous others, to prepare a Paper on "Metallurgical Literature," to be read before the Iron and Steel Institute or some other society, but, unfortunately, the war prevented its completion.

The first 35 pages are concerned with Mr. Blight's ancestry, and are not without some literary interest. Numerous plates, chiefly of family portraits, Baptist groups and chapels, illustrate the text. This book is of little interest to our readers, although it was only in response to many requests that publication was given it.

J. B.

# Random Shots.

No sooner is one Stein finished with than up springs another. Following in the funeral procession of the "Stein Song" (which died the natural death of all jazz songs—overwork) comes "Ep" of the same ilk, bearing, phœnix-like, his latest work, "Genesis." It is truly wonderful how this crudely-shaped piece of stone has whipped the public interest into a cream of indignation and controversy. Especially when we English are regarded by our Continental *amis* as an inartistic race. Even the very highbrows have referred to Epstein as "art-rending."

* * *

The nationality of these precocious Steins is quite obvious: Palestein. Einstein is supposed to have caught the ether bending, but I have heard rumours (unless I was drunk last Tuesday evening) that he has renounced the theory of relativity, which, by the way, a dear old lady at Wigan once confused with eugenics. A third Stein, Gertrude, the American authoress, is a writer but dimly comprehended by we crop-haired lowbrows. Her books are notorious for the miserly use of full-stops, these occurring at uncertain intervals of two or three pages.

* * *

You may possibly have noted my inclination towards detective stories as entertainment fare. Having been provided with an excellent example by Francis Everton in his "Hammer of Doom," I intend writing a "thriller" myself, staged in a foundry underworld which teems with crooks, racketeers, patternmakers, moulders and other bad men. Here, in brief, are the opening chapters. Fines and Sweepings, two charge hands in the foundry of Wastenot, Wantnot, Limited, are known to be sworn (and swearing) enemies. During an afternoon melt, Fines disappears, Sweepings later declaring that his companion was either drunk or terrified—probably drunk.

* * *

Now the castings of this particular melt turn out wasters, and the works manager of Wastenot, Wantnot, Limited, threatens to dismiss the metallurgist and hero, Aubrey Marmaduke St. Aubyn (who really is not a metallurgist, but a rich young man from Mayfair, who loves the manager's blue-eyed, golden-haired daughter, Milly Meter) unless he can explain the cause of these wasters. Aubrey has a brilliant scientist friend, Kish, who analyses the castings and finds them astoundingly high in carbon and containing some foreign matter.

* * *

From this, the theory is advanced that Sweepings pushed Fines through the cupola-charging door and so cremated him. This would explain the high carbon content in the iron. But a complication arises. Fines owned a massive, old-fashioned turnip watch of nickel, which cannot be found amongst his possessions. Now, presuming that Fines had the watch about his person at the time when he was bundled into the cupola, the waster castings would have contained a small percentage of nickel. Careful analysis fails to reveal the slightest trace of this element. Possibly, then, a person unknown is in possession of the watch, and this person may, or may not, be connected with the murder or murderer. Sweepings is arrested, but protests innocence.

* * *

To cap this, the watch is discovered in an old coat of Meter, works manager, who also is arrested, but will make no statement. Milly, his daughter, implores Aubrey, her sweetheart, to vindicate her father by seeking out the murderer, and this he promises to attempt. And at this point I must leave you to unravel the threads of the mystery yourselves.

Marksman.

# The Sesci Furnace at the Close Works, Gateshead.

On a recent visit to Newcastle we took the opportunity of inspecting the Sesci furnace installed at the Close Works of Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Gateshead-on-Tyne.

As the furnace was only engaged upon its 28th cast, it is too early to speak of operating costs. With pulverised-fuel furnaces it is particularly difficult to take the fuel costs out on an individual heat, as there is always a certain quantity of coal dust in the storage hoppers.

Coal of two types is received on a platform, situated at the back and above the furnace proper. It is charged into a Rex atomiser, which by means of carborundum grinding wheels reduces the coal to a fine powder. The pulveriser also blows the fuel into a cyclone, which separates the coal dust from the carrying air and drops the fuel into one of two hoppers. The escaping air is filtered through a series of canvas bags, situated above each hopper. The object of having two hoppers is to permit of the storage of both high and low volatile coal. The former is used for a short time when lighting up a cold furnace. The pulverised fuel is carried to the burner by a stream of hot air, made so by inserting an air preheater into the flue system carrying away the products of combustion. At the point of mixing the high volatile pulverised fuel with the air, a pyrometer connection is in place, and as the temperature at this point rises to 200 deg. C., the supply of this fuel is cut off and replaced by the low volatile coal. The air for combustion is supplied by a blower, and both that and the fuel supply are controlled by variable-speed motors. The furnace proper consists of a cylindrical casing lined with an acid refractory rammed into position round a template and forming a monolithic mass. The shell rests on two pairs of short roller paths and is rotated by a chain drive. Though it is of 5 tons capacity and weighs when lined about 40 tons, the effort of a few men can rotate it without any mechanical aid. The unique feature about this furnace appears to be the combustion chamber itself. To commence with, the mixture of coal and hot air is led into the combustion chamber through a pipe which is fitted with a rotating airtight joint. The mixture then passes through a set of carborundum bars shaped like an ordinary fire-grate. This has the effect of splitting up the stream prior to ignition. After the mixture has passed the bars, ignition immediately takes place and combustion is completed in the combustion chamber before entering the furnace. Another outstanding feature of this furnace is the fact that the air, from leaving the blower until after combustion is completed, is in totally-enclosed circuit and can therefore be controlled very accurately, thus reducing possibilities of oxidation.

Two tap-holes, diametrically opposite, are provided for emptying the furnace. These are made up with oil-sand cores, and no difficulties of any kind have been encountered. Owing to the sweetness of rotation, it is easy to control the stream of metal as it leaves the furnace, and it is no exaggeration to say that one could fill a pint pot without spilling.

At the exhaust end of the furnace, a movable exhaust box, mounted on wheels, and lined with refractory material, provides a means for the hot gases to enter the flue system. The exhaust box is moved in or out of position by an electric motor—a hinged steel flap covering up the entrance to the flues. The recuperator, which is heated by the exhaust gases, consists of a nest of pipes, around which the hot gases circulate. A by-pass can be put into action which will short-circuit the recuperator and give straight access to the chimney.

The rotation of the furnace is effected by means of a variable-speed motor operating the chain drive through a reduction gear. A special control arrangement allows rotation to be effected, either at full speed or exceedingly slowly, in either direction or oscillatory. The instruments necessary for the control of the furnace are all neatly assembled on a panel. The whole of the electric part of the installation has been built by the English Electric Company.

The furnace is charged by a water-cooled apron conveyor, mounted on a wheeled bogie. This permits of the rapid and easy filling of the furnace from the burner end to the charging hole. By its use five tons can be loaded in 20 min.

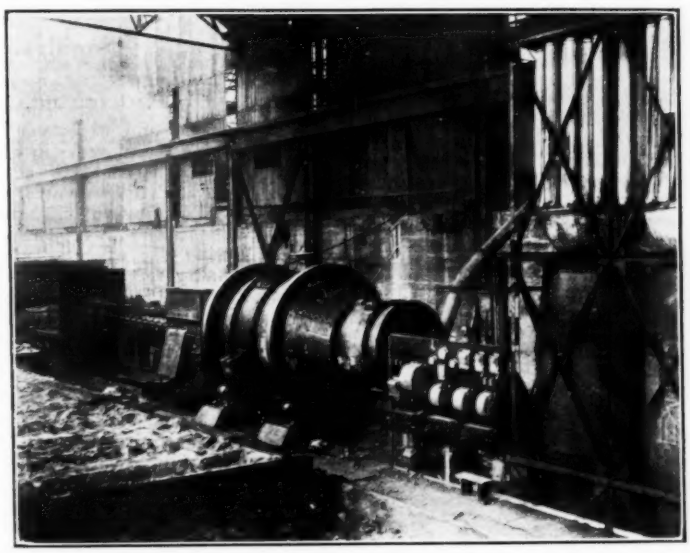

FIG. 1.—THE 5-TON SESCI FURNACE INSTALLED AT THE CLOSE WORKS, GATESHEAD. THE INSTRUMENT PANEL IS SHOWN IN THE FOREGROUND.

### Results Achieved.

The metal for high-grade grey-iron castings was poured after 2¾ hrs.' working, starting from cold. The second charge was accomplished in 1 hr. 50 min. The metal appeared to us very much like high-carbon steel poured at a slightly low temperature for that metal. The moulders informed us that it teemed like "oil" and was obviously much hotter than cupola-melted material. A charge of scrap gave a 19-ton tensile iron. We are personally satisfied that the iron losses are extremely low, as we examined the slag, which resembled the refining slag of the electric furnace just before it reaches the condition where it "falls," though obviously this slag is of an acid character.

The furnace is making, in addition to high-grade iron castings, special pig-irons for sale to other foundries. In this connection it is interesting to note that at the time of our visit a pig-iron casting machine, supplied by Bagshawe & Company, of Dunstable, was in course of erection.

We feel reasonably certain that this will be the first time in history that British foundries will have the opportunity of testing-out special high-grade pig-iron cast in chills of British manufacture.

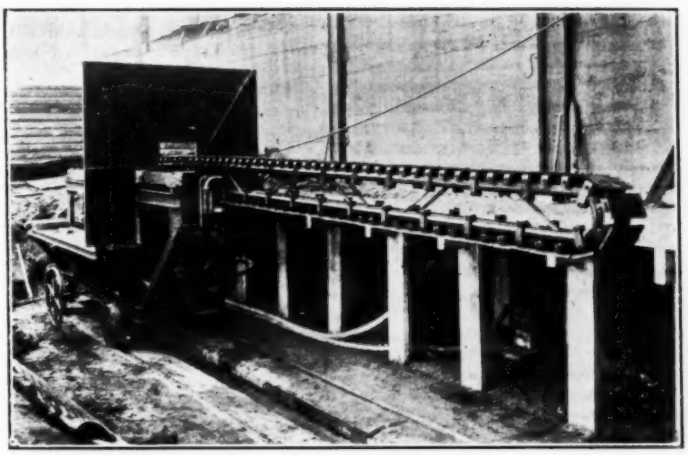

FIG. 2.—THE WATER-COOLED APRON CONVEYOR WHICH CHARGES THE SESCI FURNACE.

We desire to thank Major Bird (managing director) and Mr. Scott (foundry manager) for the help they have given us in the preparation of this article.

The Sesci furnace, by the way, is handled in this country by Messrs. Pittevil & Company, of 22, Laurence Pountney Lane, London, E.C.4.

D

# Moulding a Cylinder Without a Pattern.

## SCOTTISH FOUNDRYMEN EXAMINE PRACTICAL PROBLEM.

At a meeting of the Scottish Branch of the Institute of British Foundrymen, Mr. J. Longden presented a foundry problem to be discussed by the members. He had to make a casting, shown longitudinally in Fig. 1, which was a roller with 28 gills along its length. The casting was required to be steam-tight and to withstand a test of 200 lbs. per sq. in. hydraulic and 100 lbs. per sq. in. steam pressure. It was for experimental purposes, and as, possibly, it was the only one to be made, to make a pattern for the job would have been rather expensive

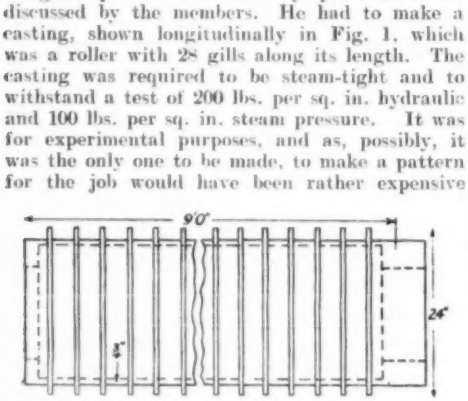


Fig. 1.—Longitudinal Diagram of Cylinder Casting.

and the time in which the casting could have been obtained delayed. In view of the need for soundness the mould should be cast on end.

In the absence of a pattern the alternative was the use of a strickle and loam, but because of the numerous gills and the weakness of the mould between them it was not practicable to striko it out with a vertical strickle in the ordinary manner. The method finally decided upon was as follows:—The roller was strickled out in the two halves of a moulding box used for standard rollers of a different design. A view of one end of one half of the box is shown in Fig. 2, and an end view in Fig. 3. Two cross-bars were made as shown at A, one for each end of the box, and these were of such a shape

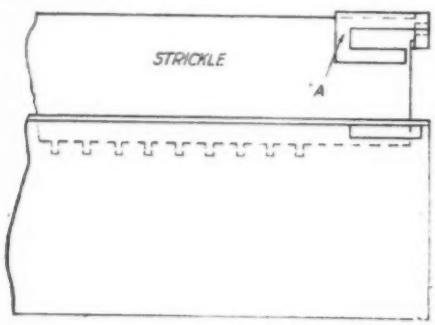


Fig. 2.—Showing One End of One Half of Moulding Box.

as to enable them to be dropped on the joint face of the box edge and then pushed under and over the lug on each side, a few wedges being used to hold it in place. At the centre of the bar and on the centre of the joint line a hole was drilled in the cross-bar to take the centre pin of the strickle. In Fig. 3 the cross-bar and strickle are shown above the box for clearness, but in actual use the cross-bar was on the joint.

In each half of the box a perfect half-mould was then strickled out and carefully struck off at the joint. The mould was blacked green. In each gill there were four slots cast (not shown in the sketch), each 4½ in. by $\frac{5}{8}$ in. These were at the level of the main body of the cylinder, and made in oil sand. They were sprigged into place; perhaps unduly so, but it was feared that any rapid evolution of gas on casting between the gills might make for trouble, so the mould was thoroughly dried and heated before closing, with the result that the oil-sand slot cores were burnt. That was disturbing in view of the need for soundness in every part of the mould, which would have to stand the rush and turbulence of molten iron dropping from a height of about 11 ft. The difficulty was overcome by simply washing the cores over again with core oil, the heat of the mould being enough to oxidise it partially. The core was struck up on trestles in the ordinary way. The mould was turned up on end and cast through ten slit runners, each 1¼ in. by $\frac{5}{16}$ in. The casting turned out satisfactory in every way. Mr. Longden said that in the course of visits to the various foundries in the West of Scotland he had observed many evidences of the moulder's ingenuity. The

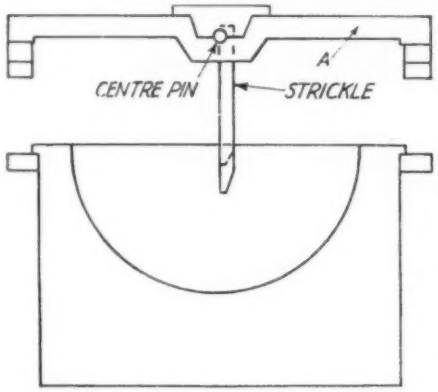


Fig. 3.—End View of One Half of Box, showing Cross-bar and Strickle.

problem he submitted was for the purpose of learning how other members of the Branch would have tackled a "one-off" job of this character.

### DISCUSSION.

Mr. Matthew Russell said that in the case of this sort a stucco pattern could have been made very quickly and cheaply. The shape of the half-core would first be strickled out, varnished and oiled, and a shell of plaster strickled on that. The mould and core could then have been made from that.

Mr. J. Longden asked Mr. Russell if he thought a pattern of that character would stand up to the hard ramming and usage necessary on a job like the one under discussion, and whether the gills would be strickled up on the pattern.

Mr. Russell replied that they could be strickled up, or they could be made separately and fastened on. Such a pattern would be sufficiently strong for the work.

Mr. Dorsie said that a satisfactory stucco pattern could have been made for the job. He would like to know what the distance between the gills was.

Mr. Longden said that the distance was 3 in. He was aware that very remarkable results could be obtained by the use of stucco, but he was not satisfied that the method in this case would have been satisfactory or more economical than the method he had described.

Mr. Robert Liddle asked how many hours were spent on the moulding.

Mr. Longden: The moulding time was 55 hrs.

Mr. Liddle said that he thought the mould could have been struck up vertically in loam and in halves. The job should then have been done in 48 hrs.

The Branch-President (Mr. J. Miller) said that in a case of this sort he would have taken the nearest plain cylinder pattern of a size larger than the casting and made the body of the mould from that with cores laid in to form the gills.

Mr. Longden agreed with Mr. Miller, and said that he would have adopted that method had such a plain cylinder pattern been available.

The Chairman said they had had quite an interesting discussion, and he hoped that other members would have problems for discussion at the next meeting. He proposed a vote of thanks to Mr. Longden.

# The Use of Ciment Fondu for Cupola Repairs.*

By P. Corbellini.

Numerous tests and experiments have been conducted during recent years in order to find a refractory material which, in addition to its strength at elevated temperatures, would possess considerable resistance to mechanical actions, and especially to the wear caused by falling materials during the charging of the cupola. Even good-quality refractory loams offered only a low resistance to these mechanical efforts.

For some years now ganisters have been extensively used; founders are aware of the excellent results which can be secured by using good highly-siliceous ganisters for repairing the melting zone of cupolas. But if these same materials are used for repairing the upper zones of the shaft, under the iron blocks which line the cupola at the level of the charging door, the results are much inferior, and these repairs have to be repeated after each melt.

The problem consisted, then, in finding a refractory material of a concrete nature *which would acquire, when cold and within twenty-four hours, great hardness.* The problem affected not only cupolas; its solution offered considerable utility in view of the repair of malleable-iron annealing furnaces. Malleable-iron founders are aware how heavy is the maintenance of these furnaces, particularly near the fire-box and above the grate.

The solution ultimately was provided by *ciment fondu*, which an Italian concern at Pola has been producing for some years. *Ciment fondu* is manufactured for building purposes, builders using it in winter because it sets even at temperatures below 0 deg. C., and because it rapidly hardens. After twenty-four hours its strength is remarkable. Its refractoriness is due to its alumina content, which is about 40 per cent. Its chemical composition is:—Silica, 4 to 5; lime, 38 to 40; alumina, 40 to 42; and iron oxides about 15 per cent.

It was thought that this cement could be used for repairing cupolas, and excellent results have been obtained by making a concrete from refractory brickbats. These should be broken up so that the reasonably large fragments suitably mix with the finer. Another method consists in using, instead of crushed bricks, loam bricks, as, for example, Eisenberg loam. The mixture is made in the dry state in a flat trough, and the whole is then just moistened with water. Too much water should not be added, but sufficient to form a pasty mortar, which can be applied in the same manner as ordinary cupola patching.

The fusion point of this mixture is lowered by about 200 deg. C., but it has been previously pointed out that the mixture is not intended for use in the melting zone, but only in the higher parts of the shaft where the temperature is very much lower. This mixture can also be used with success for the confection of permanent moulds for alloys, as it will easily withstand a temperature of 900 deg. C.

* From "La Revue de Fonderie Moderne." The author is a malleable-iron founder at Udine.

# The British Industries Fair.

### Introduction.

The Birmingham Section is designed to cover exhibits of a heavy nature, but this phrase is really relative. Actually, the major part of the show is devoted to the products of the foundry. Last year we made a survey of the catalogue and ascertained that between 25 and 30 per cent. of the exhibitors were foundry owners. This year the percentage is at least maintained, if not increased, and it makes the Fair very much of a foundry exhibition. The foundry equipment section is slightly smaller this year. We are pleased to note that our perennial criticism about the omission of a German section from the catalogue has at last borne fruit, and now not only do we have this language but, in addition, Dutch, Swedish, Norwegian, etc.

Founders should make a special effort to inspect the Fair, which, by the way, is to be visited officially by both the Institute of British Foundrymen and the British Cast Iron Research Association next Monday. In the review which follows we have confined ourselves to describing the exhibits which are connected with the manufacture of castings, and because of their number we cannot hope to describe the exhibits of the founders themselves. Even these divide themselves into two classes. For instance, Ley's Malleable Castings Company, Limited, show castings as castings, whereas the various firms associated with Allied Ironfounders, Limited, shqw their products as stove grates, baths and various types of sanitary ware. Naturally the former type of exhibit appeals more to the foundryman, as the art of founding is shown from the true technical and not from the artistic or commercial angles.

## *Foundry Equipment.*

### CONSTRUCTIONAL ENGINEERING COMPANY, LIMITED, Titan Works, Charles Henry Street, Birmingham.

The Titan Poumay cupola has so established itself as a favourite in British foundries that it can hardly now be considered as a novelty, but the makers have decided to exhibit it once more, as each month provides additional data as to economies introduced. The result has been that it is now possible to issue definite guarantees as to fuel consumption. The model on the Stand has a 5½ tons per hour melting capacity. Two Titan cupolettes are shown, one of which is the belted type, having a melting capacity of 30 cwts. per hour, and the other is the "Standard" type.

Titanite is exhibited in the form of a number of pattern plates, and the data of production from each are of extreme interest.

### THE DENBIGH ENGINEERING COMPANY, LIMITED, Horseley Heath, Tipton.

Though only a few years old, no less than 1,000 Denbigh patent hand jolt-ram moulding machines have been sold. Each year has seen some improvement, and the 1931 model shown on the Stand registers still further progress. Two types of machine are being demonstrated, a straight-lift and a turnover machine, which latter is made in two sizes. The machine, it will be remembered, is unique, in that it is the only hand-jar machine in the world. This clever machine is so designed that by raising a ram in an oil vessel forming part of a hydraulic system a variation is given which is communicated to a spring coil. This takes care of differences in the weights of patterns and sand to be impressed. When the tension is correct, the springs are then so adjusted that the load on the table is in a "dancing" position. For the straight-lift machines, the stripping is effected by the jolting handle operating through a pawl arrangement. For the turnover machines, the turnover action is effected by means of an extension spring placed alongside the machine. At the end of the turning-over operation the mould is received on two mild-steel flats, the pressure on which brings into operation a cam action, effectually preventing any further movement of the springs. Undoubtedly, this range of machines embodies the results of the continued and intelligent application of sound engineering principles.

### PNEULEC, LIMITED, Mafeking Road, Smethwick, Birmingham.

This progressive firm invariably contrive to show something quite new at each exhibition. Last year they had a new model of a jar roll-over pattern-draw moulding machine and a high-speed electric swing-frame grinding machine, which latter is also on view this year. Two entirely new machines are being shown this year. The first is the Silkysand Conditioner, which we illustrated and described as recently as January 15 this year. The second is the Pneulec B.I. magnetic moulder. Not only is this a new moulding machine, but it represents a novel underlying principle. A technical description of the machine appeared in our issue of September 18 last year. The actual machine shown is a power squeeze-strip machine, designed to take boxes up to 27 in. × 18 in.

Provision is made for adjustment of the stripping stools according to the size of box, and either round, square or rectangular boxes may be used. The length of stroke is 4 in. The method of operation is simplicity itself. When contact is made by pressing the switch the machine goes through the whole cycle of operations without further control. Pattern table and box are raised for the squeeze, the stripping stools being carried up at the same time. At the end of the stroke the stools are gripped in a dog-clutch arrangement, and remain in this extended position to carry the box while the pattern table returns to normal. The pressure head is then swung to one side for easy removal of the mould, the catches are released and the stools returned to normal position. All this happens in a few seconds and is accomplished entirely automatically.

The current consumption is 100 amps. at 240 volts D.C., and the solenoid is energised only during the actual squeezing of the mould, which takes 1 to 2 sec. The pattern draw is made on the down stroke by gravity, and the speed of the draw is regulated by an oil dashpot which, in combination with the long guide pressure spindle, gives a perfectly smooth, accurate draw. The machine can be adapted for plain strip, stripping plate, downsand frame, and downsand stripping plate, and therefore covers all the requirements that can be made of a squeeze machine.

We see no reason why designs should not be evolved covering jar ramming, as it appears to us that it is only a question of the rapid intermittent energising of the solenoid. The underlying principle of this machine opens up a new motive power for machine moulding.

Amongst the items of equipment shown is the Pneulec Royer sand-mixing machine, which represents a type of sand-preparing plant which should be amongst the first purchases by foundries commencing to mechanise. The bottom section of a cupola characterised by the placing of the tuyeres below the belt and a screw-paddle oil-sand mixer complete an excellent assortment of foundry plant.

### TILGHMAN'S PATENT SAND BLAST COMPANY, LIMITED, Broad Heath, near Manchester.

There are but few British firms manufacturing sand-blast apparatus, and it is pleasing to note the vast strides this firm has made in recent years to meet foreign competition. On the Stand they show cabinets, a rotary table complete with compressors and dust-collecting apparatus. Provision has been made for the utilisation of both high and low pressure, utilising either sand, shot or grit as the abrasive.

## *Raw Materials.*

### SIR W. G. ARMSTRONG WHITWORTH & COMPANY (ENGINEERS), LIMITED, Scotswood Works, Newcastle-upon-Tyne.

The selection of "A.W." pneumatic tools exhibited represents the very latest design in pneumatic tool construction. These tools, which are British-made throughout, embody the following unique features: (*a*) Absence of vibration, resulting in minimum of fatigue of the operator; (*b*) low air consumption, and (*c*) interchangeability of main parts—minimum of spares required. The comprehensive range of "A.W." pneumatic tools covers the requirements of the foundry trade where such appliances are and can be economically and usefully employed.

During the last few years this firm has been actively engaged in exploiting what was up to then a comparatively new process, namely, the manufacture of die-casting machines. It has only been possible to show one of the complete range of machines—this is an axle-box die-casting machine complete with tinning bath and extended working table.

For some time past this firm has been manufacturing various types of gas- and oil-fired metal-melting furnaces suitable for almost every kind of trade. The furnace, which will be working on the stand, is a 3½-cwt. non-crucible semi-rotary type furnace of which there are many in operation. By careful attention to the design of this furnace it has been possible to eliminate many of the disadvantages which existed in earlier types. The cost of operating these furnaces is stated to be extremely low, due to the entire absence of crucibles. The furnace is lined with a special material capable of withstanding several hundreds of heats before relining is necessary; this, when necessary, can be carried out at a very small cost.

Casting in aluminium has come very prominently to the fore, and in order to meet the demand so created for an efficient and economical aluminium-melting furnace this concern has produced a range, of which the exhibit is a typical example. The size shown has a capacity of 150 lbs. (aluminium) and can be supplied for either gas or oil firing.

Buyers of pig-iron have in recent years realised the many advantages which result from the purchase of first-class pigs, and it is to-day very rare that an order is placed without an analysis being submitted. In this direction the firm claims that their super-pedigree pigs are of the very highest quality, and on inspecting the polished and machined specimens exhibited, a practical proof will be obtained. Another foundry exhibit is the "A.W." crucible pit-type non-ferrous and ferrous melting furnace, 100 to 120 (brass) lbs. capacity. This type has innumerable uses, and can be supplied for either gas or oil firing in various sizes. In the larger sizes up to 1,000 lbs., however, the furnace is arranged with tilting gear. Efficient operation, small floor space required, and economical running are factors which should appeal strongly to potential purchasers of this class of plant.

### THE MOND NICKEL COMPANY, LIMITED, Imperial Chemical House, Millbank, London, S.W.1.

The properties of nickel and its alloys are shown by samples illustrating the chief products of the more important alloys, including nickel cast iron, nickel chromium, nickel silver, nickel bronze, etc. Applications are represented by various nickel-alloy components used in the automobile and marine industries. These consist of nickel-alloy steel gears, a nickel cast-iron cylinder block, a connecting rod of nickel-aluminium alloy, valves of nickel-chromium heat-resisting steel, etc., and, among the marine exhibits, turbine blading of nickel-chromium corrosion-resisting steel, nickel-copper condenser tubing, a Monel-metal pump impeller, etc.

Another interesting exhibit is a model of a 15th-century galleon, made entirely of pure nickel, with the exception of the nickel-silver

base and the enamelled flags, which are of copper-nickel. This ship was designed to show nickel in as many forms as possible, and includes sheet metal cut out and embossed for the sails, rods for the masts and wire for the ropes; the figurehead is a nickel casting and the blades of the oars are beaten out from the rod. The whole is constructed on the same lines as a wooden ship, including keel, ribs and planking, the rivets all being of nickel.

**THE STAVELEY COAL & IRON COMPANY, LIMITED, Chesterfield.**

As one would expect, cast-iron pipes to British Standard Specification, some being concrete lined, form the principal exhibit, but undoubtedly the samples of Staveley sand-spun cast-iron pipe will create the greatest interest, being a distinct novelty; for instance, there is a spring on the Stand cut from a length of Staveley sand-spun pipe, which illustrates the density and elasticity of the material of the pipe as produced by the centrifugal action of the spinning process. Rings cut from sand-spun pipes show the concentricity of pipes made by this process. It is anticipated that Staveley sand-spun pipes will be available about June, 1931.

Fractures are on view showing the different grades of pig-iron and coke manufactured by this concern.

**STEWARTS & LLOYDS, LIMITED, 41, Oswald Street, Glasgow.**

Whilst the major portion of the Stand is devoted to steel tubes, the founder will be interested in the showcases exhibiting technical data of the various brands of pig-iron manufactured by this concern and its associated companies. These comprise "Lloyds," "Islip," "S.V.B." and "B.F.M." Other interesting models on exhibit show steel chimneys, slag ladles, heat-resisting castings and structural steelwork.

### *Refractories.*

**GIBBONS (DUDLEY), LIMITED, and GIBBONS BROTHERS, LIMITED, Dibdale Works, Dudley.**

The exhibits on this Stand include sillimanite, carborundum, corundum, silica and highly-aluminous bricks, blocks and special shapes. The office is constructed with standard No. 1 Grade Firebricks, manufactured by Gibbons (Dudley), Limited, the windows being formed of silica segmental retort sections and silica combustion-chamber blocks. This firm has recently joined forces with Wild-Barfield Electric Furnaces, Limited, in the manufacture of large electric furnaces for various industrial processes, and on the Stand of the Birmingham Electricity Department the two concerns are showing a furnace having a hearth area of 8 ft. by 4 ft. This furnace is at work enamelling sheet-iron signs. A point of interest in connection with it is the new patented electrically-operated door gear.

### *Melting Plant.*

**BIRMINGHAM ELECTRIC FURNACES, LIMITED, 55, George Street, Parade, Birmingham.**

This firm's exhibit includes four electric furnaces, three of which are of outstanding interest in that they represent new designs and have not been shown or described previously. Undoubtedly of greatest interest is the continuous cast-link conveyor furnace, a type which has not previously been available in this country. This furnace has a wide range of applications, but is principally intended for the heat-treatment of large quantities of small parts such as nuts and bolts, ball races, gears, chain parts, etc.

The main points in this design of furnace are a very robust cast-chain conveyor which never leaves the furnace, and is therefore always at a high temperature, the provision of a stripper so that work can be discharged via a shute into the quench at any desired speed or angle, and a special type of hearth element which gives rapid heating and is unaffected by scale from the charge. Operation is exceedingly simple, as once the correct operating temperature and conveyor speed are set, skilled attention is unnecessary. The only labour required is a man to feed the parts on to the conveyor at the loading end, the material being automatically discharged from the quench tank by a separate conveyor.

The furnace exhibited has a belt 24 in. wide, the heated portion being 7 ft. long. It has a maximum rating of approximately 70 kw. and is divided electrically into two zones, each of which is separately and automatically controlled to ensure the rate of heating and uniformity of final temperature being constant. The output varies according to the class of work being treated, but under favourable conditions is as high as approximately 4 cwts. of steel parts per hour at 850 deg. C.

In view of the greater appreciation of the necessity of scientific accuracy in the hardening of modern high-speed steel tools, this firm has designed a new range of furnaces, one of which is shown, to meet these requirements. The outstanding features are control of furnace atmosphere together with uniformity and rapidity of heating. Ideal conditions in a furnace of this type are provided by a neutral or slightly reducing atmosphere, so that the steel being treated is neither carbonised nor decarbonised. These conditions are produced by admitting semi-burnt gases through a slit extending across the hearth of the door opening, thus effectively screening the furnace against the entrance of air. This prevents scaling of the work and at the same time makes it possible to operate the furnace with the door open.

The heating elements are "Globars," which extend from front to back along the two sides of the furnace. This arrangement gives even distribution of heat, the hearth being fully heated without over-heating any of the elements. The hearth (which consists of bonded silicon-carbide) is trough-shaped, thus preventing the charge from damaging the heating elements, and the vestibule is so designed that the hearth can be removed and replaced without disturbing any portion of the brickwork. The furnace shown has a maximum rating of 20 kw., the hearth size being 12 in. long by 8 in. wide, and the door 6 in. high.

The well-known "Birlec" furnace of the circular portable type is represented by model H.C.P.4.A., which has a hearth 36 in. long by 23 in. wide and a maximum rating of approximately 30 kw. The heating elements are also similar to those employed in the firm's larger installations, and consist of heavy nickel-chromium strip bent into zigzag form, and supported on heavy-gauge hooks made of the same metal. There is no contact between the element and the refractory, and all risks of "hot spots" owing to masking, or of any interaction between the element and the lining, are obviated, the result being a very considerable increase in the life of resisters. The supports are placed at frequent intervals so that no sagging or distortion of the element can occur. The furnace casing consists of a welded steel cylinder, which cannot easily be distorted or damaged, and, apart from the hearth, which is flat, the interior of the furnace is also circular. This construction allows of free interchange of heat by radiation, so as to ensure extremely even heating. The heat insulation varies in thickness from 6 in. to 9 in. according to the size of the furnace and the purpose for which it would be used. The maker's patented parallel-motion, insulated, socketed door is employed, which is easy to operate and is tight-fitting without clamping. It is lined with refractory and insulation, the latter being covered with nickel-chromium sheet. Opening the door operates a switch which cuts off the supply, this switch, like all other electrical parts, being safely housed at the back of the furnace. All parts of the refractory which are subject to abrasion, such as the hearth and edges of the door-opening, are provided with nickel-chromium protection, the hearth being covered with cast nickel-chromium plates, whilst the side elements are well protected with cast nickel-chromium guards. The furnace is capable of operating at temperatures up to 1,000 deg. C. and is suitable for the majority of heat-treatment processes requiring temperatures within this range.

**THE MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Works, Church Road, London, S.W.11.**

As a demonstration of radiant heat, the Stand itself is heated by means of five WFC-type radiators and a combined heating and lighting pendant in the centre. This installation will be controlled by the Morganite radiation thermostat. This instrument is the only commercial eupatheostat on the market, and differs from all other instruments for the automatic control of heating installations in that it maintains at a constant value the heat loss from the human body, which is synonymous with the state of comfort.

As the human body is hotter than the surroundings, its heat is lost principally by radiation, the remainder being lost by ordinary convection, and, in moving air, also by "forced convection." The air thermometer is sensitive to convection only and is not in any way affected by radiation or "forced convection."

The instrument comprises a sphere, 6 in. dia., heated by means of a constant input of about 6 watts, which, in comfortable conditions, will maintain the sphere at the same temperature as the human body. A thermally-operated switch is incorporated inside the sphere, which controls the heating installation in such a manner as to maintain the sphere at the correct temperature.

In certain cases, it is either advisable or necessary to mount radiant heaters overhead. Where appearance is of importance, the heating elements may be incorporated in the lighting pendants, thus making an installation which is not only exceedingly efficient but also attractive.

The Morganite hygrostat is also to be shown for the first time. It consists of a differential thermostat operating on the well-known wet- and dry-bulb thermometer principle; it is used primarily for the prevention of condensation in buildings containing electrical machinery, etc.

A Morgan's aluminium "ladling-out" furnace for melting or maintaining at casting temperature 300 lbs. of aluminium is being shown, together with a model, $\frac{1}{4}$ full size, of Morgan's patent tilting furnace, type "CA," for oil fuel. The furnace is arranged to take a salamander crucible of $\frac{3}{4}$ ton of brass, fired by low-pressure oil burner.

A wide range of refractories will be shown, including firebricks in several qualities, blocks for suspended arches and other special shapes, clay crucibles, muffles, cupels, kiln batts and props, silicon-carbide muffle sections and arch bricks, fused alumina floor slabs, combustion and pyrometer tubes, insulating tubes for thermo-couples, electric-furnace linings, indicating the wide range of refractories manufactured by the company.

**WILD-BARFIELD ELECTRIC FURNACES, LIMITED, Elecfurn Works, North Road, Holloway, London, N.7.**

A Gibbons-Wild-Barfield furnace will be in daily operation. This furnace measures 9 ft. 6 in. long by 8 ft. wide by 6 ft. high, and the maximum input is 110 kw., the power to maintain 900 deg. C. being only a small fraction of this amount. The heating elements are of heavy-gauge nickel-chrome, situated, not only in the roof, walls and floor, but also in the door to extend the usable length of the chamber to a maximum, those under the floor being enclosed, while the remainder are exposed. The heat insulation is graded according to its position in the furnace, and is so blended to reduce radiation losses to a minimum.

The door is electrically operated by means of push-button controls, the motive power being a 1-h.p. squirrel-cage motor of the Crypto Electrical Company, Limited, manufacture, while the switchgear is of Brookhirst design. The door itself is of novel form, and presents many advantages over the ordinary type of plug door. An interesting feature lies in the fact that it can be opened and closed by the operator at the control end of the Gibbons-Van Marle charging machine, which is used in conjunction with the furnace, and much time and labour is thereby saved. In addition, full automatic temperature and time control is fitted, which again reduces labour and running costs.

In addition, various types of Wild-Barfield electro-magnetic hardening furnaces and high-speed steel-hardening equipments will be in operation, while demonstrations will be given on the Vickers' pyramid hardness-testing machine for which the firm are distributors.

### *Auxiliary Equipment.*

**ATLAS PRESERVATIVE COMPANY, LIMITED, Erith, Kent.**

This firm's exhibit is one of particular interest to those concerned with the economic upkeep of plant, buildings and equipment constructed of iron and steel or timber. Their Stand is given over to the display of mechanical and other scale models of typical structures treated with "Atlas Ruskilla" iron and steel preservative paint. It is claimed that this material, by reason of the special medium employed in it, will stand up to conditions which would render ordinary paints too short-lived to prove profitable. It grips the metal tenaciously, forming a tough covering which all through its long life stubbornly resists the attacks of acid and alkaline fumes, steam, moisture and exposure to weather. This would seem to be borne out by the fact that it is extensively employed in foundries and in other places where adequate protection from corrosion is essential but difficult to obtain. "Ruskilla" is elastic, and consequently does not chip or crack, but expands and contracts with the metal. It is made in black, white, aluminium, and a range of attractive colours, all of which have good covering power and pleasing finish.

An exhibit which will attract the attention of patternmakers resident overseas relates to a product known as "Atlas A" wood preservative. This includes a number of timbers used in a test conducted by the Vernacular Forest School, Balaghat, India. These timbers were all placed in a Termite (White Ant) hill for 15 months. The untreated specimens show plainly the ravages of these insects, whilst the timbers treated with "Atlas A" are undamaged. "Atlas A" renders any class of timber immune from attack by insects, fungi, rot, etc. It hardens the timber and makes it highly fire-resistive. It is simple to use and extremely economical. The claims made for it are substantiated by reports on tests conducted by official and eminent bodies.

**BEECROFT & PARTNERS, LIMITED, Retort Works, Mappin Street, Sheffield.**

As usual part of this firm's Stand is devoted to their analytical and physical testing department, part to their services as metallurgists and general foundry experts and consultants, and part to their products and manufactures for foundry use. As they are equipped with up-to-date testing machines and laboratories, they are, by means of suitably descriptive literature, drawing attention to these services.

In the foundry consultation department attention is drawn to the "Bic" process for the production of high-duty cast irons, now so necessary in modern engineering practice. By means of this process, cast irons capable of yielding 16 to 20 tons tensile are regularly obtained, and also high transverse strength. Samples of "Bic" iron from castings, and test-pieces made from this iron, are shown.

Amongst products and manufactures for foundry use, core compounds and core oils of various grades and qualities, and cores made therefrom, are fully displayed. Samples of Beecroft's fluxes are also shown, including aluminium flux, brass flux and iron ladle flux. Chaplets, foundry studs and similar materials of high quality and finish, which are essential to all foundries, are also shown.

A runner-bush machine will be on exhibition also. This machine is designed for use in the repetition foundry, where large numbers of runner bushes of one type and size are required. It is capable of producing up to 300 bushes per hour and can be manipulated by any boy. Demonstrations of coremaking are given on the Stand showing the production of cores of various types with different compounds.

**DAVIDSON & COMPANY, LIMITED, Belfast.**

Messrs. Davidson & Company, Limited, of Belfast, the makers of the well-known Sirocco fans, have for many years past been closely identified with heating and ventilating schemes for buildings of every description, on this occasion making a special feature of air-conditioning plants, and are showing in operation a complete "Sirocco" air-conditioning unit.

Generally speaking, it is the aim of an efficient ventilating installation to reproduce natural conditions as far as possible, and to provide an atmosphere that is comparatively free from dust and dirt, odour and gases, and has a normal natural temperature and moisture content with sufficient air movement to overcome stagnation and to cool the body surfaces and gently stimulate the skin nerves. The growing appreciation of the pecuniary value of mechanical ventilation, whether it be the comfort of an audience at a theatre, cinema, etc., or its influence upon the health and therefore upon the output of operatives in a factory, has brought in its train the introduction of certain refinements in the form of air-conditioning apparatus, by means of which it is possible to control the physical properties of the air very closely and maintain it automatically at a uniform standard, irrespective of outside atmospheric variations. The "Sirocco" air-conditioning unit shown in operation demonstrates what can be done in this respect, and how it is possible to furnish an air supply, not only at a constant fixed temperature, but having also a definite moisture content. The unit comprises a preliminary air heater, spray-water heater, air washer, main air heater and fan. The preliminary air heater raises the temperature of the in-coming air to a predetermined degree above freezing point. In passing through the fine mist in the spray chamber of the washer the air is not only cleansed of its impurities, but acquires also a state of high relative humidity. A thermostatic regulator is fixed at the outlet end of the air washer and arranged in a position where it is not exposed to the free moisture from the washer, nor to the radiant heat from the main heater. It is therefore subject to the saturation or dew-point temperature of the passing air, saturation being obtained by warming the spray water. Any alteration in the temperature is instantly transmitted by the regulator to the diaphragm valves on the preliminary heater and spray-water heater, which will open to admit more steam or close according to requirement. The air is therefore always saturated and at a constant temperature. In the "Sirocco" air washer the number of eliminator plates provided is in excess of those usually found in most other air washers, with the result that all free moisture in the air current is entirely eliminated, and all risk of trouble due to entrained water is obviated. Upon leaving the washer the air is re-heated by the main heater to a predetermined temperature, which automatically gives the required humidity. This temperature is kept constant by a second regulator. Impulse is given to the valves and the regulators through the medium of compressed air from a small compressor unit. The recording instruments on the panel beside the unit show not only the temperature and humidity characteristics of the air in the main building of the exhibition, but also those of the air supply being discharged by the unit.

**F. GILMAN (B.S.T.), LIMITED, 221, High Street, Smethwick, Staffs.**

Of primary interest is a small portable grinder, ⅓ h.p., with 6-ft. flexible shaft, grinding head, ball-bearing handle, and ball-bearing handle extension, together with necessary guard, suitable for working off low voltages, 50 to 70 volts d.c., and suitable for operation with arc-welding sets. There is a really small set of this type using a ¼-h.p. machine, driving a wheel 4 in. dia. In addition to being used for grinding work, these sets can be used for drilling, by attaching the suitable drill head, which can be used either as a hand-drill or can be set up in a drill-post for heavier work.

A small high-speed set, type U.H.S., is provided for die-sinking work, and for use with small profile-grinders, for high-speed grinding of all kinds. Other sets are shown which can be used for multi-speed work; the lowest speeds being used for rotary files, rotary millers; the medium speeds being used for wire brushes, grinding wheels, drilling heads, and the high speeds, as already stated, being used for profile grinding, die sinking, and for use with small polishing bobs.

**THOS. LOCKER & COMPANY, LIMITED, Ellesmere Works, Warrington.**

This well-known manufacturer of foundry sieves is showing the Supreme electric vibrator screen, manufactured according to Taylor's patent. It is an exhibit of particular interest to our readers at the moment, when so much attention is being devoted to sand preparing.

### *Foundry Supplies.*

**WILLIAM CUMMING & COMPANY, LIMITED, Kelvinvale Mills, Maryhill, Glasgow, N.W.**

This well-known firm of foundry facing manufacturers and general foundry suppliers, who have works and branches at Falkirk, Chesterfield, Deepfields and Middlesbrough, have a very comprehensive exhibit, showing facings of all descriptions and qualities and furnishing of varied character. In addition they are showing castings loaned by customers which have actually been faced and made by the aid of the firm's commodities. They are now showing a specialty of liquid core gum, and have also just placed on the market a semi-solid compound, from which excellent results are being obtained.

One of their most recent products is a new parting powder, which is stated to have been tried with the utmost success in many foundries, and has proved quite reliable.

Messrs. Cumming point out that their firm was first established in 1840, and they claim that although ninety years of age, by keeping their methods up to date, they are still going strong, and likely to make even more progress in the future than they have in the past.

It is interesting to note from the front of their Stand that their blacking is used all over the world, and we are given to understand that chapter and verse for this claim may be obtained from any of the representatives at the Stand, who have instructions to give particulars of the goods thus exported.

**STERNOL, LIMITED, Royal London House, Finsbury Square, London, E.C.2.**

In addition to their general range of lubricating oils and specialities, this firm is showing numerous cores made with Sternocore, which will be of interest to foundrymen, as they cover a large range of varying foundry work.

## *Welding and Cutting.*

**BRITISH OXYGEN COMPANY, Angel Road, Upper Edmonton, London, N.18.**

A feature of the exhibit is a display of cutting machines for railway and structural steel work. The 55-in. universal oxygen cutting machine is being demonstrated on cutting jobs as applied to general engineering work. This machine is of special interest to manufacturers of castings, as lumps can be quickly cut from steel scrap to a thickness of 15 in. for charging into furnaces.

A new type of trolley for welding plants is being shown. It has been specially designed for indoor use, and for work in confined spaces. The ingenious arrangement of the front and rear wheels enables it to be turned almost in the space of its own axis. There is an improved type of outdoor trolley, which is very compact, and includes a detachable tool box to hold the complete equipment. Noteworthy among the new exhibits is the "Magnum" blowpipe, which has been designed to cut down the heavy expense and time previously associated with the heating of large areas of metal prior to bending.

Recent improvements in cast-iron cutting by the oxy-acetylene process are demonstrated, and should prove of interest in view of the difficulties usually associated with this class of work.

A complete range is shown of air-acetylene tools for soldering, paint-burning, lead-burning, brazing, etc., including a new battery heating tool which has been specially designed for accumulator making and repair.

**MUREX WELDING PROCESSES, LIMITED, Ferry Lane Works, Forest Road, Walthamstow, London, E.17.**

The business of supplying plant and electrodes to meet the requirements of the engineering trade is a difficult and complicated one. Industrial requirements, even in the same trade, vary so much, and it is only a large and highly organised business which can deal in a satisfactory manner with these matters. The above company has been formed with the object of combining the technical and practical resources of Alloy Welding Processes, Limited, and The Premier Electric Welding Company, Limited, in such a manner as to enable them to develop modern welding methods and applications to their utmost. In the past both of these companies have made their name by providing a highly-skilled technical service to their customers, and it will be the policy of the new company to extend and improve the service, wherever possible. With regard to electrodes, the distinctive types marketed by each of the old companies will be retained unaltered, but in each of those cases where electrodes of similar characteristics have been produced, a new type has been evolved having the best characteristics of each.

One of the most modern methods of welding consists in shielding the arc with gases which have no tendency to react with the weld metal. Such gases as hydrogen and the mixture of hydrogen and nitrogen produced by cracking ammonia, have been successfully applied with remarkable results in the finished product.

In addition to a motor generator set, and transformer welding plant, an atomic hydrogen welding plant, and an automatic welding plant are on show, also a Diesel engine-driven two-operator set. In addition to the above welding plant there is a large selection of electrodes on show, and demonstrations are being given daily of oxy-acetylene welding of copper by the Premag process, and of automatic arc welding by the Flexin process.

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The Noble Engineering Company, Limited, is being wound up voluntarily. Mr. R. S. Mays-Smith, 56, Cannon Street, London, E.C., is the liquidator.

## Obituary.

Mr. Daniel Jackson, a director of Messrs. William Denny & Bros., Limited, shipbuilders, of Dumbarton, died in Glasgow on February 10 in his 73rd year.

Mr. J. W. Percival, who was associated for 40 years with Messrs. Cammell Laird & Company, Limited, at Sheffield, for many years as commercial head of the armour plate and heavy forgings department, died at Bexhill on Sunday, February 8.

Mr. Alfred E. Howell, who was Vice-President of the American Foundrymen's Association in 1909, died suddenly on January 25. He served continuously as an officer and director of that Association until 1926, and was a member of the executive committee during 1915 and 1916.

Sir Charles Algernon Parsons, O.M., K.C.B., F.R.S., died on Thursday, February 12, at the age of 77, whilst on a cruise to the West Indies. His name will always be associated with the development of the steam turbine, which he had the satisfaction of seeing grow from the miniature single-stage turbine of 30 years ago to the multi-stage units of to-day, exceeding 40,000 h.p. Sir Charles also played an important part in the development of the turbo-compressor. He was chairman of several concerns, including Messrs. C. A. Parsons & Company, Limited, Newcastle-upon-Tyne; the Parsons Marine Steam Turbine Company, Limited; Parsons Optical Glass Company, and the Cleveland Shipbuilding Company. He was a Past-President of the Institute of Physics and of the British Association, and was awarded the Copley Medal of the Royal Society in 1928. He was the High Sheriff of Northumberland in 1898 and was a Justice of the Peace.

The Late Sir Charles Parsons.

Sir Arthur J. Dorman, Bt., chairman of Messrs. Dorman, Long & Company, Limited, died on Thursday, February 12, at Grey Towers, his residence at Nuthorpe, near Middlesbrough. He had been in poor health for some time. Sir Arthur, who was in his 83rd year, had been all his life associated with the iron and steel industry of Tees-side, in the development of which he played a dominant part. He was born at Ashford, Kent, in 1848, and in 1866 was apprenticed to Mr. C. G. Johnson, of the iron-making firm of Richardson, Johnson & Company, of South Stockton. Ten years later he entered into partnership with the late Mr. Albert de Lande Long, and founded the firm of Dorman, Long & Company. They acquired the West Marsh and Britannia Ironworks and began the manufacture of rolled joists and other sectional material, first from iron and then from open-hearth steel. Sheet and wire works and a bridge-building and constructional department were subsequently added to the undertaking. In 1899 Dorman, Long & Company joined forces with Bell Bros., Limited, for the purpose of producing open-hearth steel from Cleveland iron, and the success of this enterprise led to large developments, including the erection of steel plant at Redcar. Since 1915 Dorman, Long & Company, Limited, have acquired and absorbed the following undertakings:—Carlton Iron Company, Limited; North-Eastern Steel Company, Limited; Sir B. Samuelson & Company, Limited, and Walker, Maynard & Company, Limited. Little more than a year ago an amalgamation was effected with Messrs. Bolckow, Vaughan & Company, Limited, this merger being one of the most important the iron and steel industry has witnessed in recent years. In addition to his chairmanship of Messrs. Dorman, Long & Company, Limited, Sir Arthur Dorman was a director of Pearson & Dorman Long, Limited, the Horden Collieries, Limited, the Channel Steel Company, Limited, and Australian Iron & Steel, Limited. He was made K.B.E. in 1918 and created a baronet in 1923. He was a Justice of the Peace for the North Riding of Yorkshire, and was for many years a member and alderman of the North Riding County Council.

The Late Sir Arthur Dorman.

## Contracts Open.

**London, S.W.,** February 24.—(1) Copper rods, tubes and sheets, (2) 72,000 bearing plates, (3) 350,000 dogspikes and (4) 68,000 fishbolts, for the Madras and Southern Mahratta Railway Company, 24, Buckingham Palace Road, London, S.W.1. (Fees, £1 1s. for (1) and (2), and 10s. 6d. for (3) and (4), non-returnable.)

**Manchester.**—12,000 yds. of 4-in. socket and spigot pipes, for the Waterworks Committee. The Engineer, Waterworks Offices, Town Hall, Manchester.

**Romsey,** February 26.—Two turbines and pumps, for the Town Council. Mr. A. J. Martin, engineer, 108, St. George's Square, London, S.W.1. (Fee £3 3s., returnable.)

**Southport,** February 25.—2,484 yds. of water main, for the Southport and District Water Board. Mr. C. B. Ede, engineer and manager, 14, Portland Street, Southport. (Fee £2, returnable.)

**Stoke-on-Trent,** February 28.—Malleable iron and steel bars, plates and bolts and nuts, rivets, etc., for the Corporation gasworks. The Chief Gas Engineer, Gasworks, Etruria, Stoke-on-Trent.

**Stoke-on-Trent,** March 2.—Cast-iron pipes and connections, for the Gas Committee. The Chief Gas Engineer, Gasworks, Etruria, Stoke-on-Trent. (Fee £1, returnable.)

**Swansea,** February 18.—Cast-iron pipes and specials, etc., for the Corporation. The Water Engineer and Manager, 1 and 2, Cambrian Place, Swansea.

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**Hints for Commercial Visitors to Spain.**—A pamphlet bearing this title, prepared by the Commercial Secretary to the British Embassy in Madrid, has been published by the Department of Overseas Trade. Copies may be obtained from the Stationery Office, Adastral House, Kingsway, London, W.C.2.

# Institute of British Foundrymen.

## ANNUAL DINNER OF THE BIRMINGHAM BRANCH.

At the annual dinner of the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen, held at the Grand Hotel, Birmingham, on February 7, the Institute President (Mr. F. P. Wilson, J.P.), the Lord Mayor, Dr. D. Stirling Anderson, M.I.Mech.E. (Principal, Birmingham Central Technical College), Mr. P. J. Hannon, M.P., Mr. J. Linabury (Detroit) and Mr. Cyril E. Lloyd (formerly M.P. for Dudley) were the principal guests supporting the Branch-President (Mr. D. Wilkinson), who was accompanied by Mr. A. Harley, of Coventry, as President-Elect of the Institute.

### Foundry Certificates.

In proposing "The Institute of British Foundrymen," DR. STIRLING ANDERSON recalled that when the Institute was founded in 1904, its first meetings were held in the Birmingham Technical College, and Mr. Hiorns—who was the then head of the metallurgical department—took a keen and enthusiastic interest in its work. The Institute and the College were both striving to do the best they could to help the foundry industry in a disinterested fashion: the Institute by the spread and application of scientific knowledge to secure better production, and the College by endeavouring to give sound technical training. Commenting on the lack of young students hitherto—for one reason, probably, owing to the fact that there had been no definite goal to aim at—Dr. Anderson said he was pleased to tell them that a goal had now been provided. A committee of the Institute had recently been sitting along with representatives of the City and Guilds and of the technical education authorities. That committee had mapped out a suitable scheme of training, so that at the end of three years students could take an examination set by the City and Guilds, and those who were successful would receive certificates endorsed by the Institute of British Foundrymen. Now that was the most important educational development which had taken place since the Institute was founded.

The growth of the Institute had been remarkable. It now had 1,800 members, meetings were held in fifteen centres, and they were taking the very wise step in not excluding the young people, since they provided for junior sections in their movement. Further, their constitution was an admirable one, in so far as anyone associated with foundry work or interested in it was eligible for membership in one section or another. Nothing but good could come from the mingling of diverse outlooks.

Alluding to the foundry craft as being as old as civilisation itself, Dr. Anderson said that in former days the craftsman was regarded as a most valuable member of the community, and the artistic side of his work was very much more important than it was now. Industry had become so mechanised that large output almost swallowed the artistic side. At the same time he would be a bold man who argued that there was no art in some of the wonderful castings made in the modern foundry. While craftsmen to-day were not as skilled individually as they were a generation ago, he did not think this fact was generally to be deplored. It was not to be inferred that a man had not the ability to become skilled, but the same necessity for becoming skilled as formerly was not there.

Speaking of the foundry as striving to meet the demands of the designer for better materials, better cast iron and alloys, Dr. Anderson said the foundry had a measure of responsibility which was not exceeded by any other link in the chain. So many parts in modern machinery emanated from the foundry, and, while these might be machined afterwards to wonderful limits of accuracy, still the fundamental responsibility for sound metal and a good sound job lay with the foundry. They needed only to think of the high reputation of British goods the world over—to consider, for instance, what was involved in the winning of the Schneider Cup and in the speed record just established by Captain Campbell—to realise the magnificent part played by the British engineer and the foundry worker in making possible the achievement of these feats and in producing articles characterised by reliability and durability. It entailed the most careful work and searching investigation into the how and why of everything and the application of scientific methods; and it was in these directions that the Institute was playing a part of which they could well be proud. MR. CYRIL LLOYD supported the toast.

### Economics in Industry.

MR. F. P. WILSON, J.P., in response, said that Dr. Anderson had done, and was doing, a great deal for the Institute on its educational side. He might mention that Dr. Anderson was a member of the Advisory Committee which had been engaged in formulating schemes whereby students could secure foundry certificates; and further, he was a member of the sub-committee which drafted the syllabus for these foundry courses of instruction. Moreover, it was gratifying to know that the Birmingham Central Technical College had been approved as providing a suitable syllabus for the courses for national certificates. Birmingham was the oldest Branch in their organisation; it was founded in the same year as the Foundrymen's Association, the mother of the Institute, which also took shape in Birmingham and had its first headquarters there. Although their organisation had experienced its ups and downs, the membership was showing very definite signs of increase. Birmingham was indeed fortunate in being closely associated with the University and the Technical College, and in touch with the headquarters of the B.C.I.R.A.

After alluding, in humorous vein, to the variety of Birmingham products, Mr. Wilson emphasised the serious urgency of the question of economics in industry. That excellent and interesting pamphlet issued by the National Federation of Engineering Employers had given some figures which were very significant. The average time-rate for fitters in this country was quoted as 1s. 3d. per hour, or 58s. 1½d. per week, as ordinary earnings; whereas the L.C.C. tram driver or conductor was paid 1s. 6½d. per hour and received a weekly wage of 73s., or 3½d. more per hour; while the road sweeper in Birmingham was paid 52s. A fitter in France received 1s. per hour, in Germany 1s. 2d. and in Italy 8d. This suggested two considerations. First, that the value put on service had changed in the direction of the levelling up of unskilled labour to the level of skilled labour. Herein, he thought, they could see the need for technical education, because the temptation to the lads of to-day was to enter unskilled trades, owing to the fact that they could earn as much, or nearly as much and possibly even more, than the lads going into skilled occupations. Such education as the Institute hoped the lads would receive, as the proposed courses which developed in their technical colleges, would, he thought, tend to give them a real live interest in a craft which was worthy of their lives. Secondly, the figures indicated that in competition with the Continent their hands were tied. The pamphlet also reminded them that taxation in this country, which was an overhead charge on industry, was nearly £16 per head of the population. Against this, in France it was £10, in Germany not quite £8 and in Italy not quite £5. There, again, their own hands were more securely tied.

The Institute, however, was not directly concerned with the alteration of wages or taxation, but they had to take cognizance of these comparisons as a matter affecting their industry. Moreover, as foundrymen, they did stand for the principle of paying for work at the price it was worth; paying a man what he earned, and paying a good craftsman a good wage, and a man who did inferior work a smaller wage. They naturally looked to the civic authorities to consider the demand for economy in their municipal work, and to co-operate with them in their educational work. The Institute had never been so active as it was at present, in educational work in particular. Possibly the rank and file did not realise the vast amount of effort put forth by several members of the Council in developing and organising this educational work, nor how much they owed to Mr. Makemson, their general secretary.

One other important piece of work had just been begun by the Technical Committee, which was divided into four or five sub-committees, each of which was composed of three or four specialists in a particular sphere—cast iron, malleable iron, cast steel, refractories, etc.; and they were very busy already in collecting data in regard to specifications for all these materials. This would, as time went on, prove to be a most valuable piece of research work, and he might say it would be only the beginning of a great deal of useful work which these Technical Committees of the Institute would undertake in the future in co-operation with other technical organisations.

### Civic and American Tributes.

MR. P. J. HANNON, M.P., submitted the civic toast, and the LORD MAYOR (Alderman W. W. Saunders, J.P.), in reply, said there was a fundamental connection between the city and the foundry industries. He was impressed by the extremely useful purpose which the booklet issued by their Institute could serve, and he confessed that he had read it with considerable interest. Commending the value of the Institute in that it enabled representatives from all branches to discuss freely the problems which arose in the foundry, the Lord Mayor said that, in the present depressed state of trade, they could not afford to allow any kind of misunderstanding or lack of co-operation between the various units in industry. The Lord Mayor added that he hoped the Institute would continue to exert the good influence which it had obviously wielded in the foundry industry in the past. MR. HARRY WINTERTON proposed the toast of "The Ladies," to which MRS. D. WILKINSON (wife of the Branch-President) responded.

MR. J. LINABURY (of the American Foundrymen's Association), in proposing the toast of the local Branch, said he had a high regard for the foundrymen of Great Britain, and acknowledged that many of America's best foundrymen came from this country. Their products went to all parts of the world where quality and service were demanded, and the work of their men in the foundry and the results of their metallurgical research were sought for, studied and accepted everywhere. The Institute was doing a great and far-reaching work, and for this reason he heartily proposed the toast. As a member of the American Foundrymen's Association, he might say that they had pleasant memories of the several Exchange Papers delivered by members of the British organisation at the American Convention: Papers which had shed new light on the technical side of the industry. American foundrymen had formed the greatest respect for the painstaking thought and deep vision embodied in those contributions, and he could safely say that they

were broadening and advancing the foundry industry. Balancing their technical knowledge with the craftsmanship they so fortunately possessed in abundance, the result could not help being evidenced in better material and more accurate castings. The past few months had convinced him that they were not only alive to the advancements which the speaker cited, but were leading the way in their development and use.

Mr. Linabury alluded to the natural resources of the Midlands, and then spoke of the requirements of capital and marketing, of the need for a depreciation and reserve fund for the maintenance and renewal of plant and buildings, and of the necessity for closer contact with the designing department as another means of keeping down costs. The annual depreciation should be considered as part of the cost of castings, for it was not profitable to keep an old piece of equipment when, by drawing from the reserve, it could be replaced by a new piece, which would pay for itself in a definite time either by improvement in quality, saving in labour or floor space, or by making working conditions better. By doing this, their plant and operations were kept efficient, and their capital investment remained more or less constant instead of slowly decreasing.

Too many castings were lost and too much time taken in making castings because of the seeming profound ignorance of many designers as to foundry problems. Usually, the designers were so blissfully ignorant that they would not seek out the foundryman when designing a casting; so it behoved the foundryman to seek out the designer and appeal to him on the basis of economics, and, if he would not listen, go to the financial heads. He also suggested reducing the number of slightly different patterns, and said they all knew of cases where they could have made a better product if the design had been slightly modified. They needed good, effective plant and well-designed castings, because they affected operating costs. Unless these were right, they could not continue to market their product.

One of the most costly items was the handling of material, whether raw, semi-finished or finished. Each time it was set down and picked up again it represented someone's time, and in this connection he advised them to think in "man-minutes" as a method of securing a saving in time and labour costs. Each operation should be studied to make it suitable, convenient and expeditious, and not only the individual operation, but its relation to those before and after should be considered. Proper perspective was required to see that the various operations were evenly balanced, and not too much stress placed on one at the expense of others. When the operation was correctly equipped the workman could do more work in a day, suffered less from fatigue and could earn a better wage. The workman should have some recompense for his share of the increased output; indeed, the suspicion which many workmen had of their employers was a danger to the business and to the whole nation. To hold their markets they must conserve their human energy and time. In one American foundry, for instance, the production was scientifically studied and the methods changed and new equipment installed, so that the tonnage was more than doubled and the costs reduced by about £8 per ton, yet the floor space was only divided in two. But each foundry had its special problems; there was no fixed rule, type of plant or magic word that could improve the economic status. In a large factory where there was a foundry the latter should demand its share of new equipment appropriations, and foundry executives should be as much alive to progress as those of other departments. In other words, they should become foundry-minded.

The President acknowledged the toast, and after confessing that he had a share in the production of the Baby Austin on which Captain Campbell had just created a speed record, said members of the Institute, while out for material progress, were not unmindful of high ideals in human conduct.

A musical and humorous entertainment was given between the speeches.

## A New Cupola-Melted Material with a 1 per cent. Carbon Content.

By Werner Gilles.

The opinion of many foundrymen, who for twenty or more years considered cast iron to be a material capable of only small improvements and a scientifically-restricted territory, has been completely refuted in the last few years.

The war caused a shortage of raw materials, which resulted in the repeated re-melting of foundry scrap of the same composition. This was followed by a deterioration of cast iron, by the process known as endogamy. This process, coupled with the fact that engineers demanded higher physical qualities from the cast iron, caused scientists and experts to try anew to solve the problem of the improvement of grey cast iron.

One of the first was Lanz, who brought about an important improvement of cast iron, based on the notion that the purest possible pearlitical structure was the best fundamental condition for obtaining a tough and dense casting. Thus, with his "Perlitguss," he reached tensile strengths of about 16 tons per sq. in. and transverse strengths of about 30 tons per sq. in. That showed good progress in comparison with the iron—still smelted in many foundries to-day—which has on an average a tensile strength of 10 to 13 tons per sq. in. and a transverse test of about 23 tons per sq. in. But, although Lanz made a step forward, he reached the limit of the refinement of cast iron.

At the same time, efforts were observable from another angle to attain the required improvement by lowering the carbon content, and especially involving a fine distribution of the graphite. The main difficulty in decreasing the carbon content of the cupola metal was that the intimate contact of the introduced pig-iron with the coke charges, or even a charge containing 90 per cent. steel scrap, would result in a material with 3 per cent. total carbon content. Only a few years ago it was almost generally considered that it would be impossible to decrease the carbon content much below 3 per cent.

This widely-accepted opinion was challenged by Emmel, who worked with a high content of steel scrap associated with a special tuyere system, which enabled him to control the melting zone to a great extent. By this means he obtained a total carbon content of about 2.5 to 2.8 per cent. and tensile strength of 20 to 23 tons per sq. in.

In the field of the refinement of the graphitical separations, Schüz, who turned out castings with a tensile strength of 23 tons per sq. in. by adding to the charge large amounts of silicon; and Pardun, who developed a graphite-refining reaction by a quick cooling, were mainly successful.

Then Corsalli conceived the idea that any important improvement of cast iron would only be possible by effecting a considerable decrease in the carbon content. He worked out a method by which he succeeded in smelting a cupola metal possessing qualities never before known. The further elaboration of the Corsalli method showed that it is now quite possible to smelt a material in a cupola furnace with a carbon content of 1.5 per cent. and less, which is good for casting purposes.

The Corsalli method has been in use for several years in one of the most important foundries of Berlin, the foundry of the Berliner Maschinenbau A.-G., formerly L. Schwartzkopff and others, including a horseshoe factory in Germany. Test-bars cast in the first-named foundry on two days running showed the following total carbon contents:—

*1st day.*—1.23, 1.26, 1.21, 1.16 total carbon content.

*2nd day.*—1.15, 0.99, 1.09, 1.11 total carbon content.

The balance of the analyses was:—

*1st day.*—0.75 Si, 0.49 Mn, 0.078 S.

*2nd day.*—0.83 Si, 0.44 Mn, 0.069 S.

The tensile strength of this material varies round 33 tons per sq. in., whilst it has a transverse strength of about 60 tons per sq. in. A 1-in.-dia. cast bar which was hammered to $\frac{5}{8}$ in. and then turned on a lathe to $\frac{3}{4}$ in. showed the high tensile test of 64 tons per sq. in.; a second that of 62 tons per sq. in. It may be specially emphasised that all these results are pure workshop results and they do not refer to the laboratory results.

The Corsalli iron leaves the furnace with a tapping temperature of more than 1,500 deg. C. and is, because of its low carbon content, naturally malleable. It is suitable even for thin-walled castings, and a short annealing of 48 hrs. is sufficient to decrease the carbon content down to 0.3 per cent., thus making it possible to bend the castings cold. The high-carbon core, containing 3.5 per cent. C, which is often left in ordinary malleable castings, naturally influences the overall strength of these castings very badly. This is non-existent in Corsalli iron because of its low carbon content of about 1.5 per cent. The resultant material is not only in many cases equivalent to steel, but it is much cheaper in its production because of the admittedly low cost of cupola melting.

With that the possibilities of the uses for the Corsalli iron are not exhausted; there are many sections of the market now recognised as the domain of steel which will in a short time open their doors to Corsalli iron.

[The Corsalli process consists in coating each piece of coke with some sort of limey cement which prevents combustion taking place until arrival at the melting zone. Combustion is then stated to be so rapid—and with rapidity one can associate efficiency—that the metal is quickly melted without much carbon pick-up. It is immediately tapped into a receiver or maybe into ladles or shanks for casting.—Editor.]

## A.F.A. Officers and Directors Nominated.

The 1931 Nominating Committee of the American Foundrymen's Association has nominated the following gentlemen as officers and directors of the Association:—*President* (to serve one year), Mr. E. H. Ballard, general foundry and patternshop superintendent, General Electric Company, West Lynn, Mass. *Vice-President* (to serve one year), Mr. T. S. Hammond, president, Whiting Corporation, Harvey, Ill. *Directors* (each to serve three years), Messrs. N. K. B. Patch, secretary, Lumen Bearing Company, Buffalo; Fred L. Wolf, technical superintendent, Ohio Brass Company, Mansfield, Ohio; Dan M. Avey, editor, "The Foundry," Cleveland; R. J. Doty, plant manager, Reading Steel Casting Company, Reading, Pa.; and W. D. Moore, president, American Cast Iron Pipe Company, Birmingham, Alabama.

**British Industries Fair.**—The City of Birmingham Information Bureau has published a fourth edition of the "City of Birmingham Handbook, 1930-1931." Copies if this are available for free distribution at the Birmingham section of the British Industries Fair and also upon application to the Bureau (Council House).

# Fettling-Shop Developments.*

By F. Gentles.

Most foundrymen remember the attitude of mind of engineering towards the foundry industry prior to 1914-18. A modern machine shop and fitting shop were equipped, and then it was suddenly remembered that castings were required. A corner was found—very often not suitable—and a foundry was erected. The foundry was generally regarded as a necessary evil and not as a basic integral part of the whole engineering industry. While the moulding shop itself was usually handicapped by this treatment, the fettling shop was generally more neglected than the moulding shop itself. Indeed, one fairly modern foundry, although producing, roughly, 300 tons of castings per week, had no real dressing shop up till the latter part of 1920. The small castings were rumbled and buffed in an old, dilapidated shed, with no room for keeping separate the black castings as they came from the sand and the castings which were being handled in the process of fettling. There was neither light nor ventilation, and it was surprising that the men ever got through the work at all.

Large castings were simply taken from the moulding-shop floor and dumped outside in the rain, snow or sleet. Where castings were capable of being man-handled, these usually received some attention, but the heavier castings, which required a crane for lifting, were just allowed to lie in the open, and usually those at the bottom of the pile were wanted first. With days of rain and castings quite unprotected, one can readily understand the conditions that prevailed. To make matters worse, the only crane available was one with a very unwieldy jib, and in wild and windy weather this was dangerous, in addition to being slow.

Fortunately, conditions in both have improved considerably during the last ten years, and, while it is generally recognised that it is essential to have a well-lit and well-ventilated moulding shop, the same attitude of mind is still not universal in regard to the fettling shop. However, in these days of trumpeting about high costs in the foundry and the engineering industry generally, the fact that money can be either lost or saved in the fettling process is now slowly, but surely, being recognised.

### Allocation of Castings.

In this Paper, all remarks are confined to the treatment of iron castings for general engineering shop practice, castings of all shapes and sizes, varying from 2 lbs. to 2 tons. In dealing with, say, 80 tons of such castings per day, 50 per cent. of which allow of being rumbled and buffed and the remainder being sand-blasted and dressed by hand tools or chipping hammers, it is necessary that the allocation of the castings should receive some attention, particularly if the rate per ton for sand-blasting and dressing is higher than that of rumbling and buffing.

With castings which can be regarded as routine work, there is little trouble, but as every week is bringing changing designs, it is very necessary that attention should be directed as to which part of the shop the new-design castings should be allocated. It often happens that castings which appear to be easily rumbled and buffed have to be hand-dressed because of some weak snug or other fragile part which would not stand tumbling in the barrels, and while a few shillings may be saved in having castings rumbled, pounds may be lost in breakages, and so the need for care and supervision in routing is thus emphasised.

In dealing with the lay-out of the rumbling and buffing shop it is essential that ample space be provided for:—(1) The castings coming in from the moulding shop in the rough state; (2) the casting barrows into which the castings are loaded after being rumbled and conveyed forward to the buffers; (3) the traffic of additional rough castings coming in and the finished castings going out; (4) the chipping benches and barrows convenient for the buffers, so that there may be a minimum loss of time on the part of the men; and (5) even where an overhead crane is provided and boxes and barrows conveyed overhead, space is still an essential factor in order that the work should run without interruption and consequent loss of time.

A general lay-out is having the rumblers placed in a row—say 15 or 20 with a line shafting operating each rumbler by driving belts and the buffing machines facing the rumblers with a space of 30 ft. between. The barrels revolve in cast-iron boxes—four loose plates—consisting of two sides, front and back. Trunnions cast on the end plates form the barrel, and loose plates, either of cast iron or steel, are fixed with bolts and nuts round the circumference of the end plates of the barrel. A rectangular opening should be left in the back plate to allow of the dust being carried from the rumbler when working, up to the main exhaust pipe, and there the fan extracts the dust and then precipitates it into the exhaust tank, which should be filled with water to within an inch or two of the mouth of the downtake pipe. The recent Home Office legislation anent the grinding of metals makes it compulsory to have dust extractors. A pipe-line of, say, 16-in. bore, can be carried along underneath or above the shafting with a fan at the end of the shop and an outlet pipe of 4-in. bore acting as an uptake from the rumbler to the main outlet pipe. Rumbler covers made of wood have disadvantages, since they are easily damaged, are not dust-proof, and when any of the rumbler plates break the cover usually suffers, whilst the only advantage they have is that they are light and can be easily handled.

Covers made of mild-steel plates, $\frac{1}{8}$ in. thick, have been proved to be much more economical and effective, as:—(1) They do not get damaged so easily; (2) they are practically dust-proof; (3) by the use of a back balance, they can be very easily handled; (4) they reduce the noise of the rumbling to a minimum; and (5) more of the dust is extracted and the shop is much cleaner.

A rumbler 4 ft. long by 2 ft. diameter has fourteen cast-iron or mild-steel plates in the circumference, the plates being $\frac{5}{16}$ in. thick. To fill the rumbler, two of the plates are removed and the castings filled in. Cast-iron stars and mild-steel punchings make good cleaning material, and while the men operating the machines are not too keen about using much in the way of stars and punchings, there is no doubt that better results in the finish of the castings are to be had in this way. The average time in rumbling depends on the nature of the castings and the amount of cleaning material used, but one hour to one and a-half hours should prove quite effective.

For the rumbling of fragile castings, the combination of pieces of scrap wood from the pattern-shop, the stars and the castings tightly packed, has been proved very successful; the only criticism is on the part of the men, who, if paid piecework on a tonnage rate, do not boost up their rate by handling the wood.

### Dealing with Continuous-Casting Production.

Where large varieties of castings of various sizes and shapes are made on moulding machines on the continuous-casting principle, the cleaning becomes more of a problem, as the castings are usually emptied hot and retain their white unclean appearance even after having longer time in the rumbling barrels. This is one of the disadvantages of the continuous-casting process, and it may be overcome by the introduction of a sand-blast hose into the barrel or by longer time in the process—both methods mean money. The remedy of different strengths of facing sands for all the varied weights of castings is left out. Where machines are on continuous production, it raises a problem to have just the strength and quality of facing sand ready at every change of pattern.

When the castings have been rumbled, they must be man-handled and loaded into barrows to forward to the buffers. It is here that the men operating the rumblers object to what they term the excess use of stars or punchings used in cleaning, as these pieces, mixed among the castings, do take the men a little longer every time to unload the rumblers. When it is remembered that each man loads and empties eighteen rumblers every day, a little excess time spent on each proves quite a big factor at the end of the day to a pieceworker. As it only takes 10 minutes to load a rumbler and 15 minutes to empty one, the rumbling method of cleaning castings has a great future if some simple and quick method could be devised for emptying without the need of every casting being handled.

Before leaving the subject of rumbling, the opinion is expressed that it gives the cleanest castings at the cheapest price, and with the compulsory introduction of dust-extraction plants, under the Home Office Order, it is a much cleaner method than the ordinary dressing.

It is convenient to have the buffing machines about 30 ft. from and facing the rumblers, so as to save time in transport. The buffing machines also should be in a straight line—two wheels on one machine driven by a belt from a line shafting. The buff wheels, running at 850 r.p.m. each wheel, should be covered with a mild-steel casing, leaving only the open part for the actual buffing operation. From the casing of each wheel a mild-steel pipe, 4-in. bore, conducts the dust up to the main exhaust pipe of, say, 16-in. bore, and the fans extract the dust and deposit it into the tank outside at the end of the shop. Where chipping is necessary, a certain section of the men (usually the more skilled) should be selected for this work, as it saves time and keeps the remaining machines fully working.

With the raising of the general standard of castings demanded nowadays, even the simple operation of buffing has become quite a skilled job, as one has always to have in view the critical eye of the machine-shop inspector and maintain a standard of finish that was unknown ten years ago.

### The Pool System of Payment.

In regard to the delicate question of payment to get the output, piecework should be the rule as on the shop floor itself. Experience proves that where there is a large variety of castings with more or less unit rates (and no piecework shop is without what are dubbed by the men as good or bad jobs) some men have the good all the time and others the bad all the time. Then again, when certain castings—in the bad category—are required urgently there is always difficulty in getting them finished to time.

By the adoption of a pool or gang system a great deal of trouble can be avoided—as by fixing an overhead rate for the output of the shop—it is to the interest of all the men that the output remains at a steady figure, and the jobs that are being urged can be got through the shop without any delay. An objection to this method is, of course, that all the men are not quite equal in capacity, but that can be overcome by the good men setting the pace and chiding the slow men to follow suit. The pool or gang method also saves considerable time in clerical labour, as there is only the weighing to

* A Paper presented at a meeting of the Scottish Branch of the Institute of British Foundrymen, Mr. J. Miller (Branch-President) presiding.

be recorded, the overhead rate being fixed on a tonnage basis. One objection to the method is that should any work not be properly done there is not the same evidence to reveal the man who did the job badly, but this objection is more assumed than real.

It is an advantage also to have the men at the rumblers in the same pool or gang as the buffers, as this ensures a steady flow of work from the rumblers to the buff. The pool or gang rate must, of course, be made to include both squads of men.

### Developments in Dressing.

When the subject of what is commonly known as dressing is considered, one is conscious of three great developments which have become more or less universal during the past ten years —the use of the sand-blast, pneumatic hammer and portable grinder.

Sand-blasting is the term which has come to be applied to the process of cleaning castings by the concentrated force of an abrasive, either sand or steel shot, at high velocity directed on the castings to be cleaned. The plant consists of a chamber made up of mild-steel plates to the size determined by the work to be done, having a glass roof, through which the light comes, and having the floor made up of cast-iron grid plates to allow of the sand and shot passing through the floor of the chamber, either to the exhaust tank outside or to the return chamber. If castings of, say, from 2 cwts. to 3 tons are handled, it is necessary to have two bogies—preferably with the wheels having ball bearings—to allow of easy movement, so that one bogie can be filled with castings while the other is in the chamber with castings being sand-blasted. Two sets of rails, of course, are provided on the floor of the chamber itself and carried well out into the shop to facilitate loading. The door or doors can be made as found convenient, either sliding or opening in halves as found suitable for the work to be done in the plant. Turning tables may also be found an advantage in the blast chamber.

When blasting the sand and shot fall through the gratings on the floor into the hopper collectors and from there pass into the main exhaust pipe, and the fan suction draws out the material, the sand being delivered to an exhaust tank outside. The shot is collected in a collector, and is used over and over again. It will be understood that a certain percentage of the shot is lost, although a slight recompense is made by the operators using the very small stones which also find their way among the shot and are used in the return.

### Three Sand-Blasting Systems.

The three systems in general use are the pressure, the suction and the gravity feed. The abrasive is contained in a closed chamber, to which air pressure is introduced; the air and abrasive pass through a control valve and discharge through a nozzle at the end of a pipeline. Not being here specially concerned with the relative merits of the respective systems, only the general principle involved has been outlined. Anyone deeply interested can have full information from the various makers of the respective types of plant in which he happens to be specially interested.

In the chamber described, the operator works inside protected by suitable clothing and helmet and leather gloves, the operating valves being under his own control. The work is carried on by two men, one in and one out alternately. There is no need, of course, for the man who is out to be idle, as he can proceed with the loading of the next carriage and dig out the rough of the cores, the coring itself being finished to a very fine degree by the sand-blast. The Home Office have, within recent years, laid down definite regulations in regard to the operators. Each man must be supplied with overalls and a helmet and gloves, and if another man uses the helmet it must be disinfected before the second man uses it. It is to be hoped that in the near future there may be evolved, for this type of plant, methods which will allow the operator to work outside the chamber and direct the nozzle to the cleaning of the castings. In a number of the motor foundries they have sand-blast plants erected for the purpose of cleaning the engine parts which are both efficient and clean. The castings are placed on a rotary table inside the chamber—there is glass on one side which enables the operator to see the cleaning. The rotary table is controlled by a lever and the abrasive jet is directed on the castings as it revolves on the table. When the castings are finished on one side the operator opens the end sliding door, turns over the castings, and both sides are cleaned in a very short time. The operators are never in actual contact with the dust at all, and it is a type of plant that would be of great benefit if it could be applied to the blasting of larger castings and so avoid the necessity of anyone being inside the chamber in actual contact with the dust. The rotary table in this case is totally enclosed by the housing.

The third type is where the rotary table is only half enclosed. The castings are laid on the open half of the table, and as the table revolves the castings are taken round under the direct blast, come round to the operator again, are turned over, blasted on the other side, come round again and are taken off, ready for any chipping that may be required. This latter type is only suitable for very small castings, and while not so clean as the enclosed rotary table type, is comparatively clean, as the operator is not in contact with the sand. There are other modifications, such as the use of conveyors under the blast, but the three types in general use have been dealt with. The important factor is to have a plant that suits the work normally handled and does the job quickly and efficiently.

### Selection of Abrasives.

In dealing with the abrasives to be used, a great deal depends on the quality of finish desired, the quality of facing sand used in the mould, and the amount of time spent blasting. With the introduction of moulding machines and the tendency to work with less facing sand, the use of steel shot, round about 24 mesh, has become good general practice. A medium steel shot gives a good finish to the casting; the loss by impact is not great, and if the reclaiming plant is in good order very little shot need be lost. The distance and angle at which the nozzle should be held by the operator also varies according to the type of casting. If the casting is long and plain, then a fairly broad sweep is possible. On the other hand, if the casting is heavy and bulky and the sand burned in, then the nozzle must be held closer to the casting to get the same result.

With regard to the nozzles themselves, these should be made of hard cast iron, and, as they do not cost much, should be frequently renewed, for, as the nozzle wears, the pressure will drop with a consequent decrease in the abrasive rate, resulting in either longer time on the job or less clean castings.

The finish obtained by sand-blasting is quite different from the finish given by the tumbling barrel. Discussions frequently occur regarding the relative merits of each process, but each has its application in the varieties of work in the shop, and both can be used with equal advantage.

While the initial cost and upkeep of a sand-blast plant is fairly high, it should be remembered that:—(1) Cleaner castings are obtained with less finishing on the part of the moulder and the dresser; (2) less time is spent preparing facings; (3) the castings, when they reach the finishing department, are more easily painted and look finer; (4) all the grit is taken off the castings, which means an increase in the life of the tools in the machine shop for, as founders are so often reminded, the tool in the machine is made to cut iron, but it cannot cut sand; and (5) with the standard demanded in modern engineering and the continuous development of machine moulding, a sand-blast plant is essential in the modern foundry.

### Pneumatic Chipping Hammers.

It is surprising in how many modern foundries hand chisels and hand hammers are exclusively used. A few months ago the writer was in a number of up-to-date foundries in the Midlands of England, and he was surprised that so few pneumatic chipping hammers were being used. In most cases it was attributed to the conservative instincts of the men—one or two had been tried—but they had returned to the old practice. As the pneumatic chipping hammers are introduced into each shop, and the men become accustomed to their use, it is only a question of time until those tools are universally adopted in every modern fettling shop.

Granted that there is the initial cost of a compressed-air plant and all the necessary piping and rubber hose, plus the continuous repair of the hammers, still, in any shop where both methods are in use, the modern method of the pneumatic tool is proved to be a sound proposition. Their adoption usually results in a better job being done in less time, a decided gain for both the man and the employer, and general satisfaction all round.

The chisels for use on the pneumatic hammers require some attention; if the quality is not just up to standard, the chisels usually break at the neck, just at the end of the barrel. The operators, too, have to be watched in this respect, as some damage their air hammers and break their chisels by not holding at the proper angle and applying the weight of their left hand to the neck instead of the nose of the chisel.

For the special information of any who might be interested in the introduction and use of pneumatic chipping hammers, caution is advised in deciding just which make of hammer is adopted, because, having once decided on a particular make, it is wise to keep to it; every change-over means carrying spares for each type —a very bad practice. Another factor to be borne in mind when making the first decision of the type to be adopted is the comparative weight. The lighter the tool, the less weight to be held up all day on the part of the operator, the less fatigue, and consequently happier conditions and more work done in the working day. The average weight is 10 lbs. each.

### Portable Grinding Machines.

The portable grinding machine is another necessary tool in the fettling shop of a modern foundry. Machine- and fitting-shop practice has rendered the production of castings a fine art to very fine limits. Dealing with the machine-shop requirements first, the development of jigs and fixtures has made demands on the foundry which the foundryman often thinks quite excessive, allowing tolerances of $\frac{1}{32}$ in. in many cases. Say a casting is located by pins in a jig, and a slight swelling has taken place just at the places of location, the whole sequence of operations can easily be thrown out of gear, with a probable loss of all the castings so affected, particularly if the operator in the machine shop has not noticed the trouble and has sent the casting forward to the next operation. For castings which cannot be dressed to fine limits on the ordinary buffing wheel—either because of being too bulky or too heavy—the portable grinder is just the tool for the job. Here, again, compressed-air plant piping and hose is necessary, but the cost and upkeep is more than justified, as what is spent in the foundry is more than recovered by the modern methods in the machine shop. The relations in the fitting shop are much the same, as fitting allowances and piecework rates are usually based on castings coming from the foundry dressed and chipped to definite limits and gauges. In the

author's shop there are over 150 various types of gauges and templets to which the various castings must conform. The need for some handy tool is thus easily seen, and the portable grinder serves the purpose excellently.

### Welfare.

Since the introduction of the Home Office regulations regarding the grinding of metals, the rumbling and buffing parts of the fitting shop have become much improved from the point of view of cleanliness and health, and attention should now be directed to improving the other sections in the shop. Most fettling shops could be much improved in the way of lighting, heating and cleanliness. It is a problem dealing with the dry sand from the coring and the castings, and it may be that the problem could be solved by having cast-iron grid plates on the floor, the sand falling through into hoppers and conveyed to settling tanks by means of air suction. With the modern practice of cores and more cores in every job, the problem of dealing with the dry sand in the fettling shop increases year by year. The reclaiming of such sand is a question about which there is a great diversity of opinion, and this aspect of it is left for open discussion.

Regarding payment in the dressing part of the shop, here, again, the pool or gang system has distinct advantages, and there is no necessity to repeat the arguments for and against.

The selection of the fettling-shop foreman must be carefully effected. His position is a difficult one, and the wrong man may lose his employers hundreds of pounds, or, on the other hand, get everybody into trouble by erring on the wrong side. He must "know" a casting, and this knowledge implies a very great deal. He must accept all sorts of castings from the foundry floor, and where possible make the best of them without grumbling—a grouser is no use for the job—unless he is helpful. If he calls the foreman moulder's attention to a bad lot, he gets an explanation of how it happened or didn't happen, and is usually left with the "baby to hold" and the castings to put right. Again, he may get good castings, but make a poor job of them, which also creates a bad impression. Finally, if a foundry possesses a good foreman in the fettling shop, keep him—he is a good friend.

### DISCUSSION.

MR. J. C. DORSIE said that they had listened to a most informative and thought-provoking address. Most foundrymen, he was afraid, were still viewing the problems of the fettling shop from the angle which Mr. Gentles had so long ago discarded, but the time would soon come when they would be compelled to adopt the author's attitude as presented in the Paper. His (the speaker's) firm had not yet been called upon to deal with the dust problem on a large scale, although their grinders and tumbling barrels were fitted with a dust-exhausting system. He would like to know whether the tumbling barrels of which Mr. Gentles spoke were fitted with ball bearings or roller bearings.

MR. GENTLES replied that the barrels were fitted with ordinary cast-iron bearings, and a long life had always been obtained. He admitted that most modern tumbling barrels were fitted with ball bearings and other "fancy gadgets" which sometimes were not really necessary.

MR. W. MCCULLOCH asked if in the sand-blast room described any artificial light was provided.

MR. MOREHEAD inquired whether Mr. Gentles had experienced any trouble with the abrasives in the sand-blast room striking the glass of the roof and sides of the cabinet. He would also like to know if Mr. Gentles had any experience of the hydraulic system of cleaning out cores such as he understood was in use at the Allis-Chalmers works.

MR. GENTLES replied that their sand-blast room was made of steel with a glass roof, and the effect of the abrasive material was considerable on both. Wooden battens were used in the room for supporting the castings, and these had to be renewed every three months. Strong lamps were erected outside and above the centre of the roof. His experience was that, provided the roof was regularly brushed and kept clean, there was no trouble in getting sufficient light in the cabinet. He understood that at the Allis-Chalmers works the hydraulic system was operated at a pressure of 1,300 lbs. per sq. in. At the works with which he was connected the pressure was 1,000 lbs. per sq. in. with which they had made some experiments. He had found a certain amount of difficulty in removing oil-sand cores.

MR. A. CAMPION wrote that he was sorry that the General Council meeting, held in Manchester that day, prevented him being present to hear Mr. Gentles' Paper. He had been looking through the Proceedings of the Institute, and found that on only one occasion had the fettling shop been dealt with and, strangely enough, that was by a Scotsman, Mr. John Watson, who was at one time manager of the steel foundry at Hallside. Mr. Watson, in a Paper before the Sheffield Branch in 1916, dealt with the subject from quite a different angle from that which Mr. Gentles had viewed it, as he confined himself to the question of output and man-power efficiency in a steel-fettling shop.

### Size of Stars.

The Branch was fortunate in being able to obtain a Paper which broke new ground, and could congratulate itself upon securing the services of an author so well qualified to deal with the subject. Mr. Gentles had a unique experience in the fettling of castings of very varying form, size and purpose. He was in a position to realise how important was the dressing of castings in the realm of modern foundry practice necessary to meet the demands of the machine shop. He thought Mr. Gentles had succeeded in giving a very succinct account of the processes of the fettling shop, and also shown that the old notion that any odd corner of the establishment was sufficient, for the dressing could no longer be tolerated. Rumbling had been very fully dealt with, and was doubtless the most suitable process for certain types of castings. There was one aspect of the rumbling of castings upon which he would be glad to learn Mr. Gentles' views, and that was the relative efficiency of small and large pellets. He quite recently had heard two foundrymen discussing the point; one maintained that the usual stars were too large, and a much greater efficiency and better skin resulted if the stars were made about one-fourth the usual size. The other claimed that a comparatively small number of large stars gave the better result. It seemed to him that something could be said for both views, and he would be very glad to know whether Mr. Gentles had any experience of the use of different-sized stars, and also if he had any views as to the hardness of the stars.

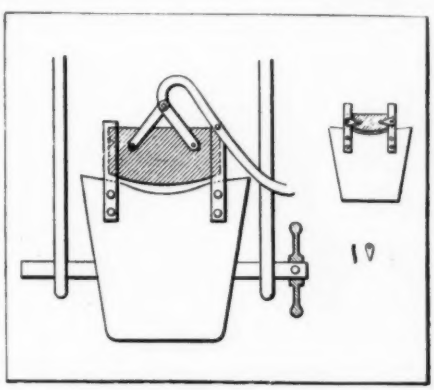
In many foundries, especially jobbing shops, pneumatic chipping chisels were largely employed for the removal of fins and other superfluous metal with considerable success, but in the case of the more delicate castings there was some risk of damaging the castings, and he knew of some foundries where grinders driven by pneumatic or electric power had been installed for the purpose. Had Mr. Gentles any experience of such tools, and could he say anything as to their performance? He had heard it stated that the pneumatic portable grinder worked quicker and more efficiently than chisels; also that pneumatic power is cheaper and more efficient than electric power for such tools. The President recently made the statement that castings are in many instances practically machined castings before they leave the foundry, and he thought that members would be inclined to agree to that view after what Mr. Gentles had said and the examples he had shown to them. He offered his congratulations to Mr. Gentles for the interesting Paper he had submitted.

The CHAIRMAN (Mr. James Miller) said they had listened to an excellent Paper from one who was thoroughly acquainted with the subject. The author had shown that, when properly organised, the fettling shop would amply repay any time or money spent on its development. He asked them to accord a hearty vote of thanks to Mr. Gentles.

## A Mechanical "Slagger" for Foundry Ladles.

In "La Revue de Fonderie Moderne," CAMILLE SEQUERT, foundry manager, of Chevillon (Haute-Marne), describes a method of constructing mechanical "slaggers" for both large and small foundry ladles.

Two U-shaped iron flats are bolted on the edge of the ladle, on either side of the spout. The arms of these U-pieces are at such a distance apart as to allow a flat fire-brick to slide freely between them, the brick acting as the actual "slagger." One of the two U-pieces is extended rather higher than the other in order to carry a bolt which serves as a pivot for a gooseneck lever. Two holes are bored in the brick whereby to insert two short bolts carrying pieces to connect it with the gooseneck. Upon assembly one has an efficient "slagger" which can be operated and held at the level of the iron by anyone, without exposure to the heat of the



A NOVEL SYSTEM FOR SLAGGING LADLES.

metal or risks of burns. If the lever is arranged at that side of the ladle where the tilting wheel is located the "slagger" can be operated by the pourer.

For small ladles and crucibles, a smaller and somewhat simpler gadget can be used. The U-shaped iron flats are replaced by two angle-iron arms, fixed on both sides of the spout. The flat fire-brick is replaced by a loam cake, running vertically in the angles, on the inside of the ladle or crucible and between the inwardly-turned flanges. To prevent the cake falling into the crucible, pivoting lugs are mounted on the flanges of the angle-irons. These lugs are sufficiently tight not to pivot of their own accord and should allow sufficient play between them and the flanges for the cake to slide freely up and down. When the loam cake is worn out, the lugs are turned aside, a new cake inserted and the lugs returned in position. The ladle or crucible is once more ready for use.

These mechanical "slaggers" are simple, practical and inexpensive. They assure efficient slagging of the iron and will avoid disputes and loss of time.

## An Uncommon Type of Runner.

By "Vallishe."

The subject of runners or gates is one of great interest and importance. It is not often that one comes across anything new in them, but occasionally one discovers something departing from normal practice.

The runner described and illustrated in Figs. 1 and 2, although perhaps not new, can claim to be quite uncommon to many foundrymen. It should, however, be stressed that such a runner is only of advantage in special cases and is not recommended when the more usual types of runners are quite applicable to the job. It should be placed in the category of *special* runners.

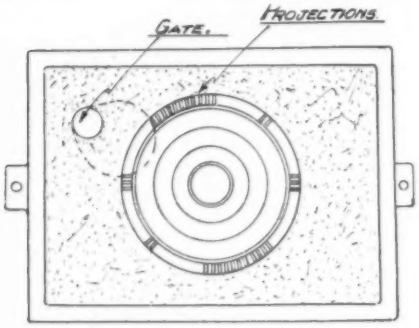



Fig. 1.—Plan with Top Part of Box Removed.

In the illustrations the runner is shown quite clearly and hardly calls for any description. The box is a shallow one and of small proportions. Regarding the casting to be made, a brief description of its own peculiarities is necessary in order thoroughly to outline the advantage of the runner.

The casting in question is not unlike a small spur wheel, insomuch as tooth-like projections are formed on the whole circumference of the casting. These projections, however, are rather thinner than the average tooth (for such a diameter) and are spaced close together. The diameter of the "wheel" is 5½ in. and the depth of the projections 1 in. An unusual casting no doubt. A great deal of trouble had been previously experienced in the production of these castings. The chief difficulty encountered was the gating. To run the casting on the side was, of course, impossible, and, consequently, the top of the casting suggested itself as the best place to run it. This was done, but with hardly a fair measure of success. At least 40 per cent. of the castings had to be rejected on account of the poor formation of the outer projections. In several instances some of these were almost entirely missing, whilst others were badly washed. Quite a few types of runners were tried, coupled with other suggested improvements in the structure of the mould, but little headway was made, and the percentage of wasters continued to be a source of great annoyance and anxiety.

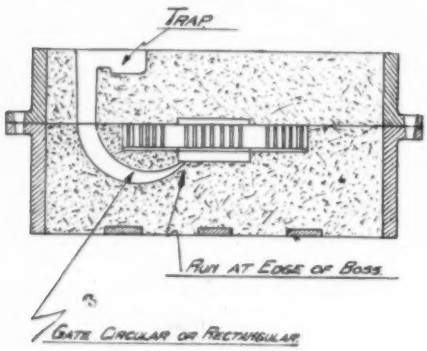



Fig. 2.—Elevation, showing Gate.

Ultimately, however, this special runner was tried, and after a little experimenting the percentage of wasters was reduced to under 4 per cent. Also a much sharper casting was obtained, and in every way the job was satisfactory. Not one of the projections lacked uniformity.

No doubt there are many who would dispute the advantage of such a gate over the general type used. Nevertheless, in this case it proved its true worth, and perhaps would be of great assistance in the production of other similar intricate castings.

## A Brass Water Vessel.

By H. Littlehales.

As is well known, the art of handling metal in almost any form was carried out with much success in Flanders in the sixteenth century. Brass, tin, iron and pewter were all dealt with, and with excellent results. Our picture, furnished by kindness of the Director of the Victoria and Albert Museum, illustrates a piece of brass work executed in that country at that time. It is a fine, tall vessel, almost 2 ft. in height, and exhibits its peculiar craftsmanship not so much in its ornament as in the lines of fluting and strange globular form. In this piece, artistic appearance has been given only secondary consideration to utility in the shape and placing of the spout. It will be noticed that the spout is so set on the vessel that the contents can be easily poured however full it may be. Set on the spout is an ornament in the form of a human face which covers almost the whole of the surface.

A Brass Water Vessel of Flemish Origin.

The handle is not a success, being little removed from the commonplace, and the manner of its fixing leads one to suppose that the craftsman by whom the rest of the work was made had little part in either making or fixing the handle. The fixing of this part seems, indeed, to indicate it as having been set on by a very amateurish hand.

## Iron and Steel Institute.

### AMERICAN MEETING, SEPTEMBER, 1932.

As previously announced, an invitation has been received from the American Institute of Mining and Metallurgical Engineers and the American Iron and Steel Institute to hold the 1932 Autumn Meeting of the Iron and Steel Institute in the United States. As the Institute of Metals has also received an invitation to hold its Autumn Meeting in America at the same time, it is considered that it will be to the mutual convenience of both Institutes to make joint arrangements as far as possible for ocean travel and inland travel in America, independent arrangements being made for the technical meetings. The excursions to works are expected to be available within limits to members of either Institute.

A provisional Committee of Organisation has been formed at New York to prepare plans for the reception of the visitors, Mr. H. Foster Bain, Secretary of the Am. Inst. M.M.E., acting as Hon. Secretary. The inclusive dates for the technical meetings and excursions have tentatively been agreed upon as September 12 to September 29, 1932. The following is the provisional time table:—The main party will leave Southampton by Cunard liner on September 3, 1932. On arrival at New York the party will put up at the Pennsylvania Hotel. On Sunday afternoon, September 11, excursion by steamer round Manhattan Island, and on Monday, registration at headquarters, Engineering Societies Building, 29, West 39th Street, New York. Technical sessions in the auditorium and Room No. 1. In the afternoon short excursions can be made to works in or near the City. On Tuesday, September 13, continuation of technical sessions in the Engineering Societies Building. Local excursions in the afternoon.

Between September 14 and 30, excursions will take place to Waterbury, Conn. (American Brass Works); Bethlehem, Pa. (Bethlehem Steel Works); Washington (U.S. Bureau of Standards); Pittsburgh (Mellon Institute, Carnegie Institute of Technology, Steel Works, Works of the Aluminum Company); Youngstown (large steel plants); Detroit (Exhibition of National Metal Association, American Society for Steel Treating); Cleveland (Steel Works); Chicago (Steel Works); Niagara Falls; Hamilton, Ont. (Steel Works or Nickel Works); Toronto; Montreal; departure, by steamer, on September 30; arrival in London on October 8. Alternative excursions to Duluth (Mesabi Iron Range); and Algoma (Steel Works).

Plans are under consideration for participation in some form by the Canadian Institute of Mining and Metallurgy, either at Toronto or Montreal or both. It would greatly facilitate the plans of those who are acting as hosts in America, as well as the arrangements for ocean travel of the party, if members would indicate now, as far as they can, whether definitely or provisionally, whether they propose to take part in the meeting in America in 1932. The arrangements, both for ocean travel and for the extended tour in the U.S. and in Canada, are in the hands of Messrs. Thomas Cook & Sons.

An inclusive charge will be quoted for ordinary first-class accommodation on the steamer, for Pullman-car accommodation in America and for hotels in New York and elsewhere. This inclusive charge may be expected to amount to about £125 for the round journey from London back to London, and for those desiring superior accommodation on the liners and on the special train, an additional charge will be made.

**S.A. Manganese Corporation Exports.**—Since traffic commenced on the Postmasburg-Koopmansfontein railway towards the end of June, 1930, the following tonnages of manganese ore have been exported from Durban up to December 31, 1930:—High-grade ore, about 43,650 short tons; low-grade ore, about 14,900 short tons; total, 58,550 short tons.

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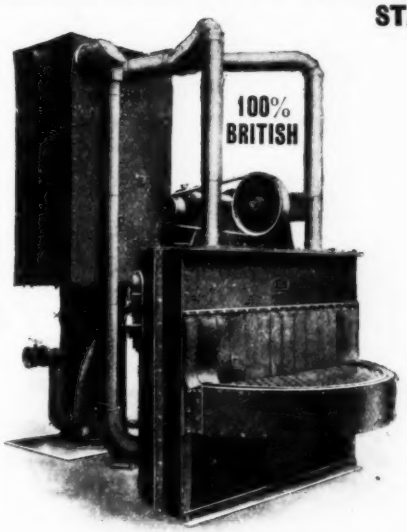


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STUDS, CHAPLETS, BRUSHES, CORE ROPES, BUCKETS, SPADES, Etc. LADLES, FIRE BRICKS, STONE FLUX, CASTING CLEANERS, PIPE NAILS, SPRIGS, WIRE BRUSHES, BELLOWS.

## Trade Talk.

The Sheffield Chamber of Commerce has received an invitation from a firm in Chicago for Sheffield firms to quote for 25,000,000 safety-razor blade blanks, to be taken at the rate of 5,000,000 a year.

Messrs. Alfred Herbert, Limited, Coventry, have been appointed sole agents in this country for the lathes and special machines manufactured by the R. K. LeBlond Machine Tool Company, of Cincinnati.

On March 1, International Combustion, Limited, the Underfeed Stoker Company, Limited, and Combustion Steam Generator, Limited, will move from their present offices in Africa House, Kingsway, to Aldwych House, Aldwych, London, W.C.2.

Messrs. R. A. Lister & Company, Limited, of Dursley, are to provide free dental and medical treatment for all their employees. The same concern has also established a contributory pensions scheme to enable all their employees to retire at the age of 65.

The Leeds City Council has accepted the tender of Messrs. Edward Wood & Company, Limited, Ocean Ironworks, Trafford Park, Manchester, for the constructional steel framework for the new Civic Buildings in Calverley Street. The value of the contract is approximately £30,000.

Messrs. H. Tollemache & Company, of Canada House, Norfolk Street, London, W.C.2, have received an order from Messrs. John Lysaght, Limited, for pulverised-fuel plant in connection with the chilled-roll melting furnaces at their Swan Garden Works, Wolverhampton.

The proceedings at the special conference between the Engineering and Allied Employers' National Federation and various trade unions, held in London on January 30 (Sir Allan Smith in the chair), have now been published in pamphlet form, under the title "Wages and Working Conditions."

The partnership between Messrs. T. J. Munnoch, A. G. A. Barton and W. R. Marsland, carrying on business at Manor Lane, Halesowen, Birmingham, as the Halesowen Foundry Company, has been dissolved. Mr. A. G. A. Barton and W. R. Marsland are continuing the business in partnership.

Messrs. Alldays & Onions, Limited, Great Western Works, Small Heath, Birmingham, have purchased from the liquidator the whole of the goodwill, patents and patterns connected with the foundry equipment business of the Britannia Foundry Company, of Coventry. This, of course, includes a full range of the well-known Britannia moulding machine.

Work to provide the additional waterside facilities on the Manchester Ship Canal which were asked for at the forming of the Lancashire Steel Corporation, Limited, is likely to start in the near future. The plans, which are in connection with recent developments at the Partington Steelworks, are for extended quayside arrangements, and for new handling and discharging plant.

A University of London announcement states that a course of four lectures on "Hardness and Hardening" will be given at the Imperial College, Royal School of Mines, London, S.W., by Dr. W. Rosenhain (Superintendent of the Metallurgy Department in the National Physical Laboratory), at 5.30 p.m., on March 2, 9, 16 and 23. At the first lecture the chair will be taken by Prof. Sir Henry C. H. Carpenter. The lectures, which will be illustrated with lantern slides, are addressed to students of the University and to others interested in the subject. Admission is free, without ticket.

The Stanton Ironworks Company, Limited, near Nottingham, have received instructions from Mr. J. Ferguson Bell, the general manager and engineer of the Derby Gas Light & Coke Company, to supply a cast-iron main, 16 miles in length, consisting of 12-in. and 15-in. dia. De Lavaud spun-iron pipes, fitted at each length with Stanton-Wilson flexible joints, for connecting up their Belper gasworks with coke ovens at Clay Cross and Blackwell, to transmit coke-oven gas from batteries of coke ovens situated at these two points. This installation is of interest in that flexible joints are being used in connection with cast-iron pipes for protecting the main against possible subsidence of the ground, and against vibration resulting from road traffic.

The first of two ships now building for the P. and O. Company's Australian service was launched at the Barrow shipyard of Messrs. Vickers-Armstrongs, Limited, on Thursday, February 5. The vessel has an overall length of 664 ft. and a breadth of 80 ft. The main propelling machinery consists of two separate turbo-alternators, each with its own condensing plant and auxiliaries, supplying power to two slow-speed synchronous motors which are coupled direct to the twin propeller shafts, a contactor cubicle being provided to control the power from the alternators to the propulsion motors. The steam-generating installation consists of four Yarrow water-tube boilers, working at a pressure of 400 lbs. per sq. in. The steam is superheated to 725 deg. Fah. The vessel was named "Strathnaver."

The Department of Overseas Trade announces a new departure for the purpose of stimulating credit insurance as a permanent feature in the machinery of trade. In order to get the work of the Export Credits Department more widely known and used, it has been decided to pay commissions to brokers introducing business. Efforts will also be made to link up the work of the Department with the principal business centres of the country. A similar branch office to that at Manchester is being opened at Bradford, and it is possible that additional branches in other industrial towns will be started shortly. The Department is specially anxious to give the fullest possible help where British manufacturers are handicapped in their competition with foreign rivals on account of the grant by the latter of long credits—for example, of three or four years. The Department is now prepared to do its utmost to arrange long credits of this kind.

The delegation of the Federation of British Industries, which is to visit the forthcoming Empire Trade Exhibition at Buenos Aires, is composed as follows:—Mr. J. T. Webster, Mr. E. F. Ievers (Eyre Smelting Company, Limited), Mr. John Kerr (Gourock Ropework Company, Limited), Mr. Mark Firth (Thos. Firth & Sons, Limited), Commander George Gilbertson (W. Gilbertson & Company, Limited), Mr. John Benn, Mr. V. Watlington (chairman, British Electrical and Allied Manufacturers' Association), Mr. Alexander Spencer, Mr. L. E. Mather (Mather & Platt, Limited), Mr. Robert Goudie (British Machine Tool Makers), Mr. R. C. Rootes, Mr. J. L. Battersby, Major F. P. Scott (A. V. Roe & Company, Limited), Mr. S. C. Goering (Babcock & Wilcox, Limited), Mr. J. G. Anderson, Major Charles Pratt (R. A. Lister & Company, Limited) and Mr. W. A. C. Nation. Arrangements are being made for the delegation to meet leading business men of the Argentine and to study industrial conditions in that country.

## Personal.

Sir Hugh Bell celebrated his 87th birthday on Tuesday, February 10.

Mr. Donald Russell-Ferguson has been elected a director of the Ardrossan Dockyard, Limited, shipbuilders and engineers, of Ardrossan.

Mr. John T. Symington was recently the recipient of gifts in recognition of the completion of 50 years' service with the Consett Iron Company, Limited. Mr. E. J. George, general manager of the company, made the presentation.

Mr. T. A. Greer, for 50 years associated with the Fairfield Shipbuilding & Engineering Company in various commercial capacities, latterly as secretary, has, at his own request, been relieved of the secretarial duties. His services, however, will be retained in a consultative capacity, whilst Mr. J. S Featherstone has been appointed secretary.

Mr. Oliver Lyttelton, a managing director of the British Metal Corporation, Limited, has joined the board of Msesrs. Henry Gardner & Company, Limited, and Mr. A. M. Baer, a managing director of the latter company, has joined the board of the British Metal Corporation. Both gentlemen are directors of the Amalgamated Metal Corporation, Limited.

## New Companies.

**C. S. Roberts & Company, Limited,** 21, Lancelot's Hay, Liverpool.—Capital £100. Metal merchants. Secretary: S. J. Lambert.

**Ross & Alexander (London), Limited,** 165, Bishopsgate, London, E.C.—Capital £5,000. Tool and machinery merchants, etc. Director: E. Tyzack.

**L. Wilkinson & Sons, Limited,** Westwell Street Ironworks, Great Harwood, Lancashire.—Capital £2,000. Engineers and ironfounders. Directors: W., A., and F. Wilkinson.

## Company Meeting.

**John Brown & Company, Limited.**—A meeting of the first mortgage debenture holders of Messrs. John Brown & Company, Limited, was held in London on Friday, February 6, to consider resolutions providing for the amalgamation of part of the undertaking of the company with Messrs. Thomas Firth & Sons, Limited. Lord Aberconway, who presided, under appointment by the trustees for the first debenture holders, recalled the arrangement made in the early summer which had authorised the company to sell or transfer its Atlas Works at Sheffield and its Scunthorpe Works at Scunthorpe to any other company or amalgamation of companies on the condition that such sale or transfer must be sanctioned by the holders of the first and second debentures of the company. Thomas Firth & Sons, Limited, was engaged in heavy steel business at its Norfolk Works immediately adjoining the Atlas Works of John Brown & Company; it also carried on at other works in Sheffield the manufacture of important products, such as "Staybrite" and stainless steel, and various other specialities, but the present depressed state of the industry, more especially in the heavy sections, had rendered it necessary for Firths, equally with Browns, to seize every opportunity of introducing economies in management, in maintenance, and in operation, and of improving efficiency. With those objects in view the boards of both companies had decided that a rationalisation scheme would be of great mutual advantage, and had therefore arranged the proposed amalgamation of the steel business of John Brown & Company, Limited, with the business of Thomas Firth & Sons, Limited. The scheme had been agreed by independent committees of the directors of each company. The trustees for the first and second debenture holders had also approved the scheme

In consideration of the debenture holders agreeing to the transfer of the Atlas Works and Scunthorpe Works and other assets to Firths free from the fixed charge on the Atlas Works, and the floating charge on Scunthorpe Works and the other assets, the company would create a first mortgage on the Atlas Works and Scunthorpe Works for £600,000, carrying interest at 6 per cent. per annum and repayable by 30 yearly instalments, commencing in 1936, in favour of the first debenture holders, and subject thereto in favour of the second debenture holders. The remaining assets, consisting of stock-in-trade, stores, tools, work in progress, etc., which were to be transferred to Firths, would be taken over against the allotment to the company of approximately 450,000 fully paid-up ordinary shares of £1 each in Firths. The proposed amalgamation was a natural merger, which was expected to produce important economies and to lead to greater efficiency. So soon as it was made effective the way would be clear for consideration of the possibility of widening the basis of rationalisation of the heavy steel industry by bringing other businesses under one control, and thereby further augmenting efficiency and economy in manufacture and marketing of products and eliminating the cost of maintenance of redundant plants. It was necessary, however, in the interests of the company and Firths that the present amalgamation should become effective before steps were taken in regard to the consideration of any larger and more comprehensive arrangements.

The resolutions were carried unanimously, and at a meeting of the holders of the second mortgage debentures of the company, held subsequently, the amalgamation was also approved.

## Reports and Dividends.

**Ludlow Bros. (1913), Limited.**—Net profit, £2,064; brought in, £6,619; preference dividends, £2,366; carried forward, £5,318.

**Steel Developments, Limited.**—Profit, £4,877; brought in, £3,787; final dividend of 3 per cent., making 6 per cent., tax free; carried forward, £3,871.

**Mather & Platt, Limited.**—Net profit, £132,946; brought in, £109,855; tax account, £30,682; preference dividend and distribution of 10 per cent., tax free, on the ordinary shares, £156,336; carried forward, £55,753.

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# Iron and Steel Markets.

## Pig-Iron.

**MIDDLESBROUGH.**—During the past week there has been less activity in the Cleveland pig-iron trade. Consumers do not seem inclined to enter into heavy commitments when the sale of their own products is so restricted, although admittedly prices have sunk to such low levels that further reductions are improbable for some time to come, so that nothing is to be gained by unduly delaying purchases. For the most part present needs have been covered, and buyers are content to accept deliveries under contract. However the ironmasters are not under the necessity of pressing sales unduly. Of course, they would welcome more business, particularly forward contracts, but the current output is being well taken up, and the import of pig-iron into the Tees from the Continent has been definitely checked. Despite the fact that specially low prices are quoted for deliveries north of the Tweed, the volume of pig-iron deliveries to Scotland is very restricted, due to the slackness of the Scottish foundries. The bulk of the Cleveland make, however, is now going to the steel furnaces. Export business is still very difficult to arrange. The fixed minimum quotations for the various grades of Cleveland iron are:—No. 3 Cleveland G.M.B., 58s. 6d. per ton; No. 1 foundry iron, 61s.; No. 4 foundry, 57s. 6d.; No. 4 forge, 57s.

The condition of hematite seems to be slightly improved. One encouraging feature of the market is the continued negotiation of sales to Italy. The total output on the East Coast is now very limited, and only by withdrawals from stock is it possible to meet current deliveries. These stocks, however, are still substantial, and the makers welcome opportunities to reduce them. Locally, hematite meets with a steady sale for early delivery, and it is indicative of the current view of the outlook that up to sixpence premium is quoted for forward contracts. Prompt purchases of East Coast mixed numbers can be negotiated at 69s. per ton and No. 1 at 69s. 6d., but some of the makers are still holding out for a minimum of 70s. per ton. On the North-West Coast, Bessemer mixed numbers are at 68s. per ton at works.

**LANCASHIRE.**—Buying of pig-iron in this market is still largely a matter of covering early needs, bulk buying for forward delivery being almost unknown. There is, however, no reason to believe that foundry-iron users are taking any smaller quantities into consumption than was the experience several months ago, and sellers are disposed to absorb some little comfort from this fact. Derbyshire and Staffordshire No. 3, for delivery to users in the Manchester price zone, is offered at 69s. 0d. per ton, Derbyshire forge at 64s. 6d., Northamptonshire foundry at 68s., Cleveland at around 71s., and Scottish brands of No. 3 at 90s. to 91s. West Coast hematite iron is quoted at 82s. 6d. per ton.

**THE MIDLANDS.**—Ironfounders are still of the opinion that the bottom level of prices has not yet been reached, and, as they are not heavily engaged, they are buying nothing for forward despatch, confining themselves to their moderate requirements for early consumption. Values remain unchanged at 67s. 6d. for No. 3 Northants and 71s. for Derbyshire and Staffordshire No. 3, these figures including delivery to local stations.

**SCOTLAND.**—The quiet conditions of this market are unaltered. With the exception of certain light castings and pipe founders, buyers, owing to scarcity of orders, are buying from hand to mouth, and any business done is only for small lots. No. 3 Scotch foundry iron is at 73s. 6d. f.o.t. furnaces, with a minimum of 2s. 6d. per ton extra for No. 1 quality.

## Finished Iron.

There is still much competition for all grades, and the mills are working spasmodically. Crown bar prices continue to vary, and are at anything from £10 upwards, with nut and bolt iron at about £8 15s. The works get little support for this latter grade. The bulk of the common iron for the nut and bolt trade is being imported from abroad, and the present rate for the Belgian No. 3 product is as low as £5 delivered in the Darlaston district. Staffordshire marked bars are still at £12 10s. at works, but conditions are unchanged and the mills are only moderately occupied.

## Steel.

Substantial orders for finished steel are still very scarce, and the works are compelled to keep going on small orders, which in many cases entail frequent changing of rolls and thus increased costs. The small steel bar market is weak. The sheet makers all complain of scarcity of work, the only exception, perhaps, being in the case of mills making special qualities. The galvanised steel sheet market, depending mainly on export orders, remains depressed, with no sign of any improvement in the demand. No further decline appears to have taken place in prices of Continental semis, although little fresh business is going forward to the works. There is only a poor demand for British semi-finished steel, but prices are fairly well maintained.

## Scrap.

In the Cleveland market, merchants still report an extremely limited demand for all classes of iron and steel scrap, and prices continue to sag. The price of ordinary quality cast-iron scrap is 48s. 6d. per ton, with machinery quality at 51s. The slight improvement reported last week in the market in the Midlands area is maintained. Heavy machinery cast-iron scrap is offered at 57s. 6d. to 60s. delivered, and ordinary heavy metal at 57s. 6d., with light cast-iron scrap at 45s. delivered. There is no improvement in prices in the Scottish scrap market, but the tonnage taken up, mostly against contracts, has shown a little expansion during the last seven or ten days. The works, however, are not accepting anything like their usual requirements. With prices so low, sellers at the moment do not feel disposed to contract very far ahead. First-quality machinery cast-iron scrap, suitable for foundries, is at 55s. to 57s. 6d., with ordinary cast iron to the same specification at 50s. to 51s. 3d., cast-iron railway chairs 54s. to 55s., light metal 40s., and furnace firebars at 37s. 6d. The above prices are all per ton delivered f.o.t. consumers' works.

## Metals.

**Copper.**—Buying during the past week has been fairly good, but, of course, limited to the allocation granted to Europe, and to that extent the recent rise must be regarded with some misgiving, for inability to purchase refined copper has compelled users to hedge in standard. The general situation in the United States does not seem to have altered greatly, but the demand for manufactured copper is below expectations, due apparently to inactivity in the electrical trade.

Closing quotations :—

*Cash.*—Thursday, £45 to £45 2s. 6d.; Friday, £44 18s. 9d. to £45; Monday, £44 17s. 6d. to £44 18s. 9d.; Tuesday, £45 15s. to £45 17s. 6d.; Wednesday, £45 12s. 6d. to £45 13s. 9d.

*Three Months.*—Thursday, £45 to £45 2s. 6d.; Friday, £44 17s. 6d. to £45; Monday, £44 15s. to £44 17s. 6d.; Tuesday, £45 11s. 3d. to £45 12s. 6d; Wednesday, £45 10s. to £45 11s. 3d.

**Tin.**—Consumers continue to buy cautiously, and the general demand is still poor. The market seems still to be awaiting the Government's approval of the international "quota" scheme, which, it is generally considered, will be given. Unless there is an improvement in consumption, however, an adjustment of the proposed restriction may be necessary to produce any definite improvement in the position. There has been a moderate demand from America, while reports from the Continent speak of a fairly good demand, particularly on Russian account.

Official closing prices :—

*Cash.*—Thursday, £116 2s. 6d. to £116 5s.; Friday, £115 17s. 6d. to £116; Monday, £114 15s. to £114 17s. 6d.; Tuesday, £118 2s. 6d. to £118 7s. 6d.; Wednesday, £120 7s. 6d. to £120 10s.

*Three Months.* — Thursday, £117 12s. 6d. to £117 15s.; Friday, £117 7s. 6d. to £117 12s. 6d.; Monday, £116 5s. to £116 7s. 6d.; Tuesday, £119 15s. to £119 17s. 6d.; Wednesday, £121 17s. 6d. to £122.

**Spelter.**—In common with other metals, spelter registered quite a good advance, although the underlying conditions are virtually unchanged. Consumption is at a low ebb, and it is hard to see any justification for a sustained improvement just now. That the price is low must be admitted, but, on the other hand, statistically there is little to bring encouragement.

Daily fluctuations :—

*Ordinary.*—Thursday, £12; Friday, £12; Monday, £12; Tuesday, £12 5s.; Wednesday, £12 8s. 9d.

**Lead.**—Conditions on this market are much the same as last week. The better appearance of the market earlier in the week stimulated a little demand from consumers, but it was insufficient to make a real impression on the actual position.

The week's prices have been :—

*Soft Foreign (Prompt).*—Thursday, £13 2s. 6d; Friday, £13 1s. 3d.; Monday, £13 2s. 6d.; Tuesday, £13 7s. 6d.; Wednesday, £13 10s.

## Students' Corner.

(*Continued from page* 134.)

*Q.—Explain more fully: What are "dummy risers," and "whistlers," how they are formed and how do they function?*

**A.—"Dummy risers," or blind risers, which latter name is perhaps more suitable, have for their use and object the provision of a way of escape of dross that may gather during pouring in the top portion of the mould where it is specially desired to be clean and free from dust. Such risers pass only partly through the top-part box or cope, coming as it were to a dead end. Usually they are formed by pushing a sharp tube of the desired size in the locality required, 2 or 3 in. down, and withdrawing the tube with the sand enclosed, thus forming the blind riser of the requisite length to catch any dross that may be underneath when pouring. Such risers have the advantages of through risers minus the amount of metal, and, moreover, eliminate their inconvenience.**

**A "whistler" is formed by passing a vent wire, or something similar, through the sand at the blind end of the riser, thus passing also through the top part of the mould into the atmosphere. Whistlers are so-called because of the sound often produced when the mould is poured. It is placed there as a means of escape of entrapped gases which often gather in a blind riser. Whistlers may be applied with advantage on many small castings in the absence of blind risers. It is an expanded air and gas channel, not a molten metal passage.**

*Q.—Should through risers, feeding risers, feeding and dross heads be open or closed during the time of pouring?*

**A.—Generally speaking, risers on a green-sand mould are perhaps better closed or covered, due to the "rush-out" and not the "draw-in" of air which may possibly disturb some part of the green-sand mould. Risers on a dry-sand mould may be left open or closed, as also may be the case with loam moulds. In neither of these two cases is there any danger of disturbance. All large feeding risers, or feeding heads, on green-sand, dry-sand or loam moulds are best closed and sealed, that is, made air-tight. Risers on top of any part of a casting should always be closed, due to the possibility of sand and dust entering the mould. Cut-off risers, *i.e.*, off the joint, may be open, closed or lightly covered, except in green-sand moulds.**

Mr. J. Harold Brown, of Manchester, and Mr. John Waddell, Birmingham, have been appointed directors of Messrs. Sanderson Bros. & Newbould, Limited, Sheffield.

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# WHEELBARROWS

## ARE IDEAL FOR ALL FOUNDRY PURPOSES.
## THEY POSSESS MANY IMPORTANT ADVANTAGES.

Tray set well forward.
The load is on the Wheel.

Tray Reinforced with Stout Continuous Rod.

Broad Tyred 10-spoke Wheel.

Substantial Nose for forward dumping.

Strong Tubular Handles.

Patent Clip avoids perforating the Handle at point of strain.

Legs strongly braced cannot get shaky.

Pre-lubricated Axle-bearings. Never require oiling.

Legs bent square and fitted with renewable Shoes.

**A Sterling Product designed for hard work and built to last.**
**All parts are standardised and interchangeable for repairs.**
**Capacities from 2½ to 6 cubic feet.**
**Also special barrows for pig iron and coke.**

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**BEDFORD**

# WEEKLY PRICE CURRENT.

## COPPER.

| | £ | s. | d. |
|---|---|---|---|
| Standard cash | 45 | 12 | 6 |
| Three months | 45 | 10 | 0 |
| Electrolytic | 48 | 5 | 0 |
| Tough | 46 | 10 | 0 |
| Best selected | 47 | 0 | 0 |
| Sheets | 75 | 0 | 0 |
| India | 58 | 0 | 0 |
| Wire bars | 47 | 12 | 6 |
| Do., April | 47 | 12 | 6 |
| Do., May | 47 | 12 | 6 |
| Ingot bars | 47 | 12 | 6 |
| H.C. wire rods | 49 | 7 | 6 |
| Off. av. cash, January | 44 | 19 | 7 5/16 |
| Do., 3 mths., January | 44 | 17 | 6 3/4 |
| Do., Sttlmnt., January | 44 | 19 | 4 3/4 |
| Do., Electro, January | 47 | 17 | 11 3/4 |
| Do., B.S., January | 46 | 14 | 2 |
| Do., wire bars, January | 48 | 5 | 5 3/4 |
| Solid drawn tubes | | | 11d. |
| Brazed tubes | | | 11d. |
| Wire | | | 7½d. |

## BRASS.

| | |
|---|---|
| Solid drawn tubes | 9¾d. |
| Brazed tubes | 11¼d. |
| Rods, drawn | 9¼d. |
| Rods, extd. or rlld. | 5¼d. |
| Sheets to 10 w.g. | 8¼d. |
| Wire | 8¼d. |
| Rolled metal | 7¾d. |
| Yellow metal rods | 5¼d. |
| Do. 4 × 4 Squares | 6d. |
| Do. 4 × 3 Sheets | 6¼d. |

## TIN.

| | £ | s. | d. |
|---|---|---|---|
| Standard cash | 120 | 7 | 6 |
| Three months | 121 | 17 | 6 |
| English | 121 | 15 | 0 |
| Bars | 119 | 10 | 0 |
| Straits | 119 | 12 | 6 |
| Australian | 118 | 2 | 6 |
| Eastern | | — | |
| Banca | 120 | 2 | 6 |
| Off. av. cash, January | 115 | 17 | 7 3/4 |
| Do., 3 mths., January | 117 | 5 | 8 1/4 |
| Do., Sttlmt., January | 115 | 17 | 10 3/4 |

## SPELTER.

| | £ | s. | d. |
|---|---|---|---|
| Ordinary | 12 | 8 | 9 |
| Remelted | 11 | 5 | 0 |
| Hard | 9 | 10 | 0 |
| Electro 99.9 | 14 | 10 | 0 |
| English | 12 | 12 | 6 |
| India | 11 | 0 | 0 |
| Zinc dust | 19 | 0 | 0 |
| Zinc ashes | 3 | 0 | 0 |
| Off. aver., January | 12 | 18 | 7 3/16 |
| Aver. spot, January | 12 | 14 | 11 5/7 |

## LEAD.

| | £ | s. | d. |
|---|---|---|---|
| Soft foreign ppt. | 13 | 10 | 0 |
| English | 15 | 0 | 0 |
| Off. average, January | 13 | 17 | 9 3/16 |
| Average spot, January | 13 | 17 | 5 1/2 |

## ZINC SHEETS, &c.

| | £ | s. | d. |
|---|---|---|---|
| Zinc sheets, English | 21 | 0 | 0 |
| Do., V.M. ex-whf. | 20 | 5 | 0 |
| Rods | 24 | 0 | 0 |
| Boiler plates | 14 | 10 | 0 |
| Battery plates | 16 | 10 | 0 |

## ANTIMONY.

| | £ | s. | d. |
|---|---|---|---|
| Special brand, Eng. | 36 | 0 | 0 |
| Chinese | 24 | 10 | 0 |
| Crude | 22 | 0 | 0 |

## QUICKSILVER.

| | £ | s. | d. |
|---|---|---|---|
| Quicksilver | 22 | 7 | 6 |

## FERRO-ALLOYS AND STEEL-MAKING METALS.

| | |
|---|---|
| Ferro-silicon— | |
| 25% | £7 12 6 |
| 45/50% | £11 10 0 |
| 75% | £18 10 0 |
| Ferro-vanadium— | |
| 35/50% | 12/8 lb. Va. |
| Ferro-molybdenum— | |
| 70/75% c. free | 4/2 lb. Mo. |
| Ferro-titanium— | |
| 23/25% carbon-free | 9d. lb. |
| Ferro-phosphorus, 20/25% | £15 15 0 |
| Ferro-tungsten— | |
| 80/85% | 2/- lb. |
| Tungsten metal powder— | |
| 98/99% | 2/3 lb. |
| Ferro-chrome— | |
| 2/4% car. | £30 0 0 |
| 4/6% car. | £22 17 6 |
| 6/8% car. | £21 15 0 |
| 8/10% car. | £21 12 6 |
| Ferro-chrome— | |
| Max. 2% car. | £32 0 0 |
| Max. 1% car. | £35 17 6 |
| Max. 0.70% car. | £38 12 6 |
| 70% carbon-free | 10d. lb. |
| Nickel—99% £170 0 0 to £175 0 0 | |
| Ferro-cobalt | 9/3 lb. |
| Aluminium 98/99% | £85 0 0 |
| Metallic chromium— | |
| 96/98% | 2/7 lb. |
| Ferro-manganese (net)— | |
| 76/80% loose | £11 0 0 |
| 76/80% packed | £12 0 0 |
| 76/80% export | £10 0 0 |
| Metallic manganese— | |
| 94/96% carbonless | 1/3 lb. |

Per ton unless otherwise stated.

## HIGH-SPEED TOOL STEEL.

| | |
|---|---|
| Finished bars, 14% tungsten | £0 2 2 |
| Finished bars, 18% tungsten | £0 3 0 |

Per lb. net, d/d buyers' works.

| | |
|---|---|
| Extras— | |
| Rounds and squares, 3 in. and over | 4d. lb. |
| Rounds and squares, under ½ in. to ¼ in. | 3d. lb. |
| Do., under ¼ in. to 7/16 in. | 1/- lb. |
| Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in. | 3d. lb. |
| Do., under ¼ in. × ¼ in. | 1/- lb. |
| Bevels of approved sizes and sections | 6d. lb. |

Bars cut to length, 10% extra.

## SCRAP.

| South Wales | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| Heavy steel | | | | 2 | 7 | 6 |
| Bundled steel and shrngs. | 1 | 17 | 6 to | 2 | 3 | 6 |
| Mixed iron and steel | 1 | 17 | 6 to | 2 | 0 | 0 |
| Heavy cast iron | 2 | 7 | 6 to | 2 | 8 | 6 |
| Good machinery for foundries | | | | 2 | 10 | 0 |
| **Cleveland—** | | | | | | |
| Heavy steel | | | | 2 | 5 | 0 |
| Steel turnings | | | | 1 | 11 | 6 |
| Cast-iron borings | | | | 1 | 5 | 0 |
| Heavy forge | | | | 2 | 15 | 0 |
| W.I. piling scrap | | | | 2 | 11 | 6 |
| Cast-iron scrap | 2 | 8 | 6 to | 2 | 11 | 0 |
| **Midlands—** | | | | | | |
| Light cast-iron scrap | | | | 2 | 2 | 6 |
| Heavy wrought | | | | 3 | 0 | 0 |
| Steel turnings | | | | | — | |
| **Scotland—** | | | | | | |
| Heavy steel | | | | 2 | 7 | 6 |
| Ordinary cast iron | | | | 2 | 10 | 0 |
| Engineers' turnings | | | | 1 | 14 | 0 |
| Cast-iron borings | | | | 1 | 12 | 6 |
| Wrought-iron piling | | | | 2 | 15 | 0 |
| Heavy machinery | | | | 2 | 15 | 0 |

London—Merchants' buying prices delivered yard.

| | £ | s. | d. |
|---|---|---|---|
| Copper (clean) | 37 | 0 | 0 |
| Brass | 26 | 10 | 0 |
| Lead (less usual draft) | 11 | 10 | 0 |
| Tea lead | 8 | 10 | 0 |
| Zinc | 5 | 10 | 0 |
| New aluminium cuttings | 50 | 0 | 0 |
| Braziery copper | 34 | 0 | 0 |
| Gunmetal | 36 | 0 | 0 |
| Hollow pewter | 76 | 0 | 0 |
| Shaped black pewter | 56 | 0 | 0 |

## PIG-IRON.

*(f.o.t. unless otherwise stated.)*

| | |
|---|---|
| N.E. Coast— | |
| Foundry No. 1 | 61/- |
| Foundry No. 3 | 58/6 |
| Foundry No. 4 | 57/6 |
| Forge No. 4 | 57/- |
| Hematite No. 1 | 69/6 |
| Hematite M/Nos. | 69/- |
| **N.W. Coast—** | |
| Hem. M/Nos. d/d Glas. | 76/6 |
| „ d/d Birm. | 88/6 |
| **Midlands—** | |
| Staffs common* | — |
| „ No. 4 forge* | 66/- |
| „ No. 3 fdry.* | 71/- |
| Shrops basic | — |
| „ Cold blast, ord. | — |
| „ „ roll iron | — |
| Northants forge* | 62/6 |
| „ fdry. No. 3* | 67/6 |
| Derbyshire forge* | 66/- |
| „ fdry. No. 3* | 71/- |
| „ basic* | — |

*d/d Black Country dist.

| | |
|---|---|
| **Scotland—** | |
| Foundry No. 1 | 76/- |
| „ No. 3 | 73/6 |
| Hem. M/Nos. | 74/- |
| **Sheffield (d/d district)—** | |
| Derby forge | 61/- |
| „ fdry. No. 3 | 66/- |
| Lincs forge | — |
| „ fdry. No. 3 | 66/- |
| E.C. hematite | 81/6 |
| W.C. hematite | 84/6 |
| **Lincs (at furnaces)—** | |
| Forge No. 4 | — |
| Foundry No. 3 | — |
| Basic | — |
| **Lancashire (d/d eq. Man.)—** | |
| Derby forge | 64/6 |
| „ fdry. No. 3 | 69/6 |
| Staffs foundry No. 3 | 69/6 |
| Dalzell, No. 3 (special) | 105/- to 107/6 |
| Summerlee, No. 3 | 90/- to 91/- |
| Glengarnock, No. 3 | — |
| Eglinton, No. 3 | 90/- to 91/- |
| Gartsherrie, No. 3 | 90/- to 91/- |
| Monkland, No. 3 | 90/- to 91/- |
| Shotts, No. 3 | 90/- to 91/- |

## FINISHED IRON AND STEEL.

*Usual District deliveries for iron; delivered consumers' station for steel.*

| Iron— | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| Bars (cr.) | 10 | 0 | 0 to | 10 | 10 | 0 |
| Nut and bolt iron | | | | 8 | 15 | 0 |
| Hoops | 10 | 15 | 0 to | 12 | 0 | 0 |
| Marked bars (Staffs) f.o.t. | | | | 12 | 10 | 0 |
| Gas strip | 10 | 15 | 0 to | 12 | 0 | 0 |
| Bolts and nuts, ¾ in. × 4 in. | | | | 14 | 5 | 0 |
| **Steel—** | | | | | | |
| Ship plates | 8 | 15 | 0 to | 8 | 17 | 6 |
| Boiler plts. | 9 | 5 | 0 to | 10 | 5 | 0 |
| Chequer plts. | | | | 10 | 7 | 6 |
| Angles | | | | 8 | 7 | 6 |
| Tees | | | | 9 | 7 | 6 |
| Joists | | | | 8 | 15 | 0 |
| Rounds and squares, 3 in. to 5½ in. | | | | 9 | 7 | 6 |
| Rounds under 3 in. to ⅜ in. (Untested) | 7 | 1 | 6 to | 7 | 15 | 0 |
| Flats—8 in. wide and over | | | | 8 | 12 | 6 |
| „ under 8 in. and over 5 in. | | | | 8 | 17 | 6 |
| Rails, heavy | 8 | 5 | 0 to | 8 | 10 | 0 |
| Fishplates | | | | 12 | 0 | 0 |
| Hoops (Staffs) | 9 | 5 | 0 to | 9 | 10 | 0 |
| Black sheets, 24g. | 8 | 10 | 0 to | 9 | 10 | 0 |
| Galv. cor. shts. 24g. | | | | 11 | 0 | 0 |
| Galv. fencing wire, 8g. plain | | | | 12 | 0 | 0 |
| Billets, soft | 5 | 7 | 6 to | 5 | 12 | 6 |
| Billets, hard | 7 | 2 | 6 & up. | | | |
| Sheet bars | 5 | 0 | 0 to | 5 | 12 | 6 |
| Tin bars | 5 | 0 | 0 to | 5 | 12 | 6 |

## PHOSPHOR BRONZE.

| | Per lb. basis. |
|---|---|
| Strip | 1/- |
| Sheet to 10 w.g. | 1/0½ |
| Wire | 1/0⅝ |
| Rods | 1/- |
| Tubes | 1/7 |
| Castings | 1/- |

Delivery 3 cwt. free.
10% phos. cop. £30 above B.S.
15% phos. cop. £35 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

## NICKEL SILVER, &c.

| | Per lb. |
|---|---|
| Ingots for raising | 7d. to 1/1 |
| Rolled— | |
| To 9 in. wide | 1/1 to 1/7 |
| To 12 in. wide | 1/1¼ to 1/7¼ |
| To 15 in. wide | 1/1½ to 1/7½ |
| To 18 in. wide | 1/2 to 1/8 |
| To 21 in. wide | 1/2¾ to 1/8½ |
| To 25 in. wide | 1/3 to 1/9 |
| Ingots for spoons and forks | 7d. to 1/3½ |
| Ingots rolled to spoon size | 10d. to 1/6½ |
| Wire round— | |
| 3/- to 10 g. | 1/4½ to 1/11½ |

with extras according to gauge.

## AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

| | Dols. |
|---|---|
| No. 2 foundry, Phila. | 17.76 |
| No. 2 foundry, Valley | 17.00 |
| No. 2 foundry, Birm. | 13.00 |
| Basic | 18.76 |
| Bessemer | 19.26 |
| Malleable | 19.26 |
| Grey forge | 18.26 |
| Ferro-mang. 80% | 80.00 |
| O.-h. rails, h'y, at mill | 43.00 |
| Billets | 30.00 |
| Sheet bars | 30.00 |
| Wire rods | 36.00 |
| | Cents. |
| Iron bars, Phila. | 2.09 |
| Steel bars | 1.65 |
| Tank plates | 1.65 |
| Beams, etc. | 1.65 |
| Skelp, grooved steel | 1.60 |
| Skelp, sheared steel | 1.60 |
| Steel hoops | 1.90 |
| Sheets, black, No. 24 | 2.35 |
| Sheets, galv., No. 24 | 2.90 |
| Sheets, blue an'l'd, No. 13 | 2.05 |
| Wire nails | 1.90 |
| Plain wire | 2.30 |
| Barbed wire, galv. | 2.55 |
| Tinplates, 100-lb. box | $5.00 |

## COKE (at ovens).

| | |
|---|---|
| Welsh foundry | 22/- to 27/- |
| „ furnace | 15/- to 17/- |
| Durham and Northumberland— | |
| „ foundry | 14/- to 14/6 |
| „ furnace | 14/6 |
| Midlands, foundry | — |
| „ furnace | — |

## TINPLATES.

f.o.b. Bristol Channel ports.

| | | |
|---|---|---|
| I.C. cokes | 20×14 box | 15/3 to 15/6 |
| „ | 28×20 „ | 31/- |
| „ | 20×10 „ | 22/9 |
| „ | 18¾×14 „ | 16/3 |
| C.W. | 20×14 „ | 15/- |
| „ | 28×20 „ | 29/6 |
| „ | 20×10 „ | 21/- |
| „ | 18¾×14 „ | 16/- |
| Terneplates | 28×20 | 31/- per box basis f.o.b. |

## SWEDISH CHARCOAL IRON & STEEL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pig-iron | £6 | 0 | 0 to | £7 | 10 | 0 |
| Bars, hammered, basis | £17 | 10 | 0 to | £18 | 10 | 0 |
| Bars and nail-rods, rolled, basis | £15 | 17 | 6 to | £16 | 15 | 0 |
| Blooms | £10 | 0 | 0 to | £12 | 0 | 0 |
| Keg steel | £32 | 0 | 0 to | £33 | 0 | 0 |
| Faggot steel | £20 | 0 | 0 to | £24 | 0 | 0 |
| Bars and rods dead soft, st'l | £11 | 0 | 0 to | £14 | 0 | 0 |

All per English ton, f.o.b. Gothenburg.

### TUBES AND FITTINGS.

Over ⅛ in. up to 6 in.

| | *Tubes.* | *Fittings.* |
|---|---|---|
| Gas | 62½% | 47½% |
| Water | 58½% | 42½% |
| Steam | 55% | 37½% |

W.I. 12½% extra.

### DAILY FLUCTUATIONS.

**Standard Copper** (cash).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 45 | 0 | 0 | dec. | 22/6 |
| ,, | 13 | 44 | 18 | 9 | ,, | 1/3 |
| ,, | 16 | 44 | 17 | 6 | ,, | 1/3 |
| ,, | 17 | 45 | 15 | 0 | inc. | 17/6 |
| ,, | 18 | 45 | 12 | 6 | dec. | 2/6 |

**Electrolytic Copper.**

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 47 | 15 | 0 | dec. | 17/6 |
| ,, | 13 | 47 | 10 | 0 | ,, | 5/- |
| ,, | 16 | 47 | 10 | 0 | No | change |
| ,, | 17 | 48 | 10 | 0 | inc. | 20/- |
| ,, | 18 | 48 | 5 | 0 | dec. | 5/- |

**Standard Tin** (cash).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 116 | 2 | 6 | dec. | 27/6 |
| ,, | 13 | 115 | 17 | 6 | ,, | 5/- |
| ,, | 16 | 114 | 15 | 0 | ,, | 22/6 |
| ,, | 17 | 118 | 2 | 6 | inc. | 67/6 |
| ,, | 18 | 120 | 7 | 6 | ,, | 45/- |

**Tin** (English ingots).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 117 | 10 | 0 | dec. | 25/- |
| ,, | 13 | 117 | 5 | 0 | ,, | 5/- |
| ,, | 16 | 116 | 0 | 0 | ,, | 25/- |
| ,, | 17 | 119 | 10 | 0 | inc. | 70/- |
| ,, | 18 | 121 | 15 | 0 | ,, | 45/- |

**Zinc Sheets** (English).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 21 | 0 | 0 | No | change |
| ,, | 13 | 21 | 0 | 0 | ,, | ,, |
| ,, | 16 | 21 | 0 | 0 | ,, | ,, |
| ,, | 17 | 21 | 0 | 0 | ,, | ,, |
| ,, | 18 | 21 | 0 | 0 | ,, | ,, |

**Spelter** (ordinary).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 12 | 0 | 0 | dec. | 12/6 |
| ,, | 13 | 12 | 0 | 0 | No | change |
| ,, | 16 | 12 | 0 | 0 | ,, | ,, |
| ,, | 17 | 12 | 5 | 0 | inc. | 5/- |
| ,, | 18 | 12 | 8 | 9 | ,, | 3/9 |

**Lead** (English).

| | | £ | s. | d. | | |
|---|---|---|---|---|---|---|
| Feb. | 12 | 14 | 15 | 0 | dec. | 10/- |
| ,, | 13 | 14 | 15 | 0 | No | change |
| ,, | 16 | 14 | 15 | 0 | ,, | ,, |
| ,, | 17 | 14 | 15 | 0 | ,, | ,, |
| ,, | 18 | 15 | 0 | 0 | inc. | 5/- |

### Imports and Exports of Iron Castings in January, 1931, compared with January, 1930 and 1929.

| | January, 1929. | January, 1930. | January, 1931. | January, 1929. | January, 1930. | January, 1931. |
|---|---|---|---|---|---|---|
| *Imports.* | Tons. | Tons. | Tons. | £ | £ | £ |
| Pipes and Fittings, Cast | 2,916 | 2,255 | 1,306 | 34,139 | 28,306 | 16,779 |
| Castings, in the Rough, Iron | 168 | 298 | 166 | 4,160 | 6,511 | 3,634 |
| ,, ,, ,, Steel | 1,006 | 1,566 | 610 | 20,488 | 38,854 | 13,555 |
| Hollow-ware, Cast, not Enamelled | 1 | 4 | 9 | 85 | 505 | 654 |
| ,, ,, Enamelled | 20 | 4 | 1 | 811 | 241 | 56 |
| *Exports.* | | | | | | |
| BUILDERS' CASTINGS— | | | | | | |
| To Argentine Republic | 222 | 218 | 103 | 11,097 | 8,261 | 5,222 |
| ,, British South Africa | 260 | 307 | 157 | 8,864 | 11,536 | 6,220 |
| ,, ,, India | 154 | 177 | 127 | 5,798 | 6,154 | 4,324 |
| ,, Australia | 112 | 47 | 16 | 6,251 | 3,090 | 559 |
| ,, New Zealand | 154 | 90 | 62 | 10,247 | 5,244 | 4,002 |
| Total (including other countries) | 1,927 | 1,828 | 1,281 | 90,409 | 78,181 | 60,474 |
| PIPES AND FITTINGS—CAST— | | | | | | |
| To Argentine Republic | 425 | 1,429 | 851 | 4,702 | 13,936 | 8,067 |
| ,, British South Africa | 531 | 1,411 | 936 | 8,277 | 14,372 | 10,260 |
| ,, ,, India | 531 | 565 | 139 | 7,605 | 8,425 | 3,311 |
| ,, Straits Settlements and Malay States | 2,781 | 1,382 | 77 | 21,404 | 11,859 | 1,446 |
| ,, Ceylon | 129 | 146 | 7 | 1,243 | 1,633 | 133 |
| ,, Australia | 406 | 213 | 30 | 3,701 | 3,307 | 605 |
| Total (including other countries) | 11,101 | 11,887 | 6,294 | 113,382 | 128,951 | 74,377 |
| HOLLOW-WARE— | | | | | | |
| Cast, not Enamelled, and Cast, Tinned | 410 | 418 | 249 | 16,013 | 12,989 | 7,846 |
| ,, Enamelled | 79 | 70 | 38 | 6,711 | 5,862 | 3,853 |
| CASTINGS, IN THE ROUGH— | | | | | | |
| Iron | 85 | 407 | 103 | 4,098 | 11,436 | 3,708 |
| Steel | 68 | 208 | 154 | 3,185 | 7,065 | 6,250 |


WILLIAM JACKS & COMPANY,

WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

18, BENNETTS HILL, BIRMINGHAM.

PIG IRON

REGISTERED TRADE MARK

All grades FOUNDRY, HEMATITE, BASIC, SPECIALS, &c.

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE.

WILLIAM JACKS & COMPANY,

19, ST. VINCENT PLACE, GLASGOW.

ZETLAND ROAD, MIDDLESBROUGH.

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FOUNDRY MANAGER (42) SEEKS RE-ENGAGEMENT; practical, technical control foundries past 13½ years; expert working knowledge repetition and jobbing castings up to 50 tons for various branches engineering; economical production ordinary and high-duty metals. Highest references given.—Box 740, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY Superintendent (at liberty); 20 years' experience in production of high-class brass, gun-metal, bronze, malleable and grey-iron castings, machine-moulding and sprayed-pattern methods, oil-sand cores.—Reply, Box 742, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

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PIG-IRON. — Representatives (active) required in various districts for sale of high-grade pig-irons. Appointment of full-time Traveller for whole of U.K. might also be considered.—Applications will be treated in the strictest confidence, to "BLAST FURNACES," Box 730, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

REQUIRED immediately, Representative, generous commission basis, with knowledge of refractories, pig-irons, moulding sands, with established connection following enclosed area: Great Grimsby, Nottingham, Northampton, London. Splendid opportunity for satisfactory applicant in this south-eastern area.—Reply, Box 734, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

WANTED, by old-established firm of foundry suppliers, Representative for South and Midlands. One already having connection preferred.—Box 738, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

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SUSSEX (RYE).—The General Engineering Works known as The Rother Iron Works, comprising spacious Garage, Iron Foundry, Workshops, Lock-up Garages, 4 Cottages, for Sale by Auction (unless sold previously) on March 18 next.—For illustrated particulars apply, GEERING & COLYER, Rye, or JOHN BRAY & SONS, Bexhill-on-Sea.

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ADVERTISERS have available on Lease a small, well-equipped Foundry, never previously exploited commercially, situate in prospering and developing part of British Isles, with considerable housing shortage. Close to large city and important mass-production motor works.

The equipment comprises:—

Cupolas of 3-ton, 1-ton and 15-cwt. per hour capacity; 500-lb., 300-lb. and 140-lb. brass furnaces; 5-ton overhead crane. Complete auxiliaries, including ladles and large selection foundry boxes.

Well-equipped machine shop and smithery adjacent.

Excellent opportunity for energetic, experienced man with moderate capital, as advertisers fully prepared to consider giving any reasonable assistance; alternatively interesting to established and reputable concern desirous of expanding interests.—Full particulars in confidence to bona-fide correspondents only on application to Box 736, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

## PROPERTY—*Continued.*

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145,000 Sq. Ft. of SHOPPING,

Compact and Convenient,

**SIDING CONNECTIONS**

with L.M. & S. and L. & N.E. Rlys.

**WELL-BUILT & COMMODIOUS OFFICES**

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ALBION WORKS, SHEFFIELD.

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SAND MIXERS.—New and Secondhand. Ask us to quote.—W. BREALEY & COMPANY, LIMITED, Station Works, Ecclesfield, Sheffield.

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FOUNDRY Rumblers (two) for disposal; steel-built, in first-class condition. One 20-in. Centrifugal Sand Mixer.—W. BREALEY & COMPANY, LIMITED, Station Works, Ecclesfield, Sheffield.

FOUNDRY Polishing or Rumbling Barrel, by Canning, 18 in. x 22 in. deep, pulleys, etc.; 1 cwt. capacity. 36-in. Loam or Sand Grinding Mill, under-driven pan, iron runners 22 in. dia. Also Pneumatic Hammer, Trucks, Blowers, etc. Delivery ex stock; low prices.—Write or call, J. T. WILLIAMS & SONS, Engineers, South Bermondsey Station, London, S.E.16.

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New Pneumatic Sand Moulding Machine, admit pattern boxes 16 in. x 16 in. x 6 in.

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New 15-b.h.p. Vertical Heavy Fuel Oil Engine.

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